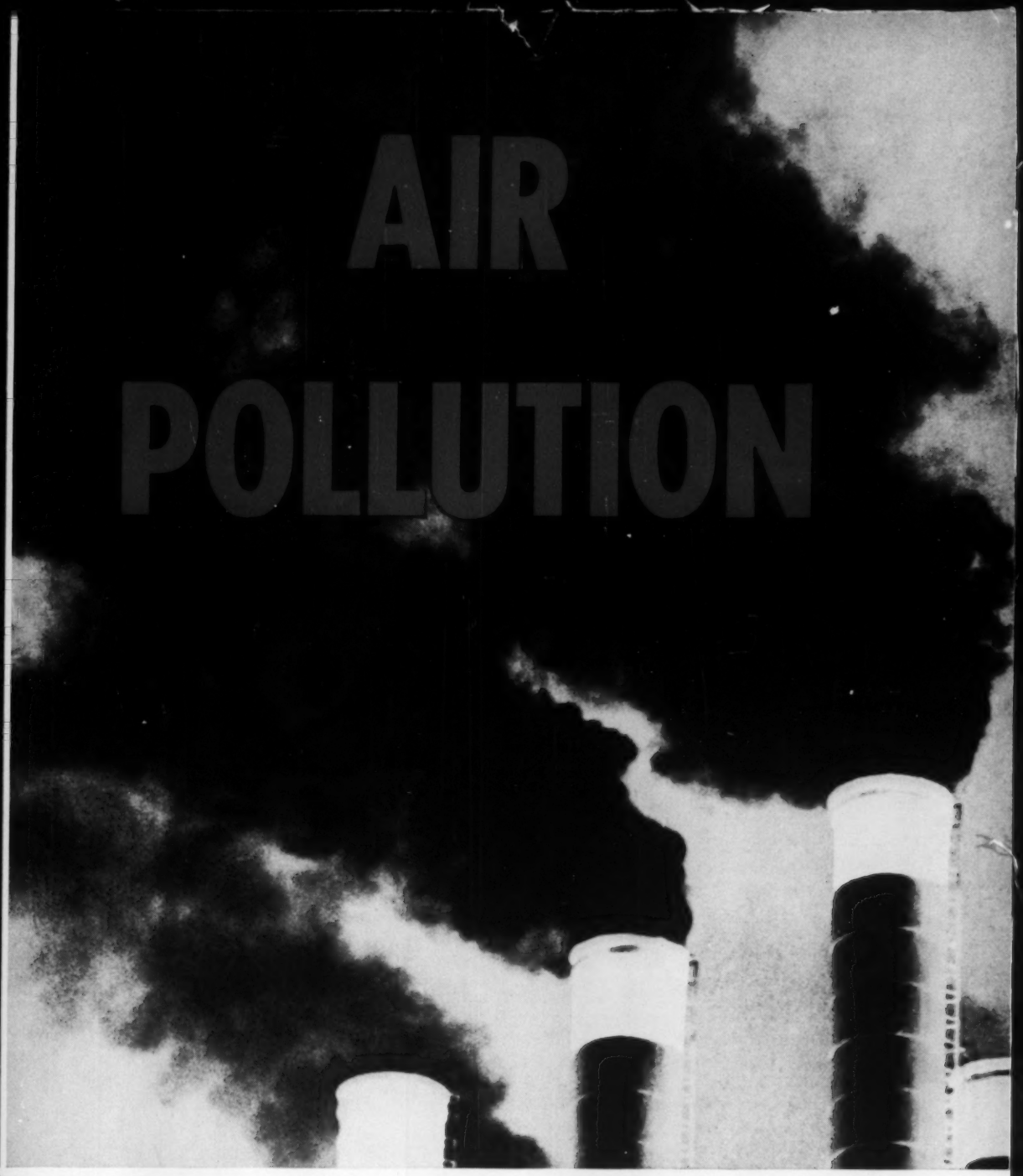
STEEL The Metalworking Weekly

APRIL 3, 1961

AIR POLLUTION



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INTERNAL GRINDING...

Are Two Wheels Better Than One?

by George H. Lockwood
Manager, Research & Development
The Heald Machine Company

Until very recently, internal grinding of a straight or taper bore has always been done with a single grinding wheel. Although this method has worked very well and will continue to be widely used, it is subject to inherent limitations under some circumstances.

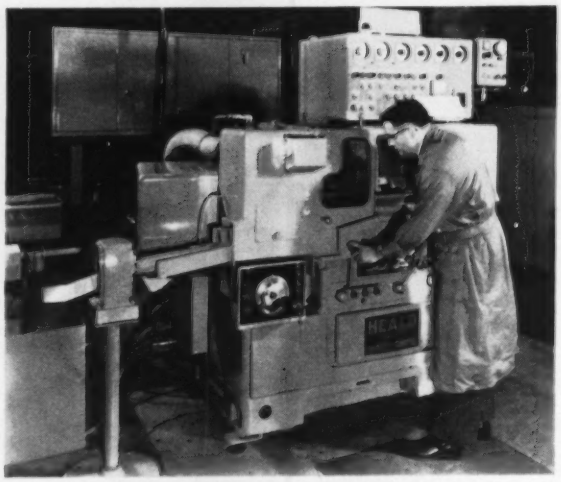
In the first place, using the same wheel for both rough and finish grinding requires a compromise in grit selection. A wheel coarse enough for maximum efficiency of stock removal in the roughing portion of the cycle may not give a sufficiently smooth surface for the finish grinding operation. So grinding speed must be weighed against surface finish, and a suitable compromise selected.

Secondly, in single-wheel grinding the wheel is usually dressed between the rough and finish portions of each grinding cycle. This increases the total cycle time by the time necessary for the dressing operation.

Both of these limitations have been removed by a unique double-wheel grinding arrangement which was first demonstrated publicly by Heald at the 1960 Machine Tool Exposition. This setup uses a single wheelhead with two separate wheels mounted on the same spindle—one for rough grinding and the other for finish grinding (see diagram below). Actual wheel specifications can be determined on the basis of maximum performance—a coarser roughing wheel for faster stock removal and a finer finishing wheel for a lower micro-inch finish. Change from rough grinding to finish grinding is simply a matter of automatically changing the position of the machine table, with no interruption of the cycle. Both wheels are dressed while the work is being loaded, hence dressing adds no time to the cycle. This represents a significant reduction in overall cycle time.

With these resultant advantages—more efficient rough and finish grinding plus no time out for dressing—a workpiece that would ordinarily require 25 to 30 seconds on a single-wheel machine, can now be ground in less than 10 seconds by the two-wheel method.

This new method is ideally suited to high production runs where maximum output is essential. But it is not the universal solution to all grinding problems. Wheel costs may run somewhat higher, since both wheels are normally dressed during each cycle and as much is removed from the finishing wheel as from the roughing wheel. An economic study of your particular requirements will show which method—one wheel or two—will yield the maximum return on your machine investment.



Heald Model 190A Centri-Matic internal grinding machine arranged for high speed double-wheel grinding of bearing races.

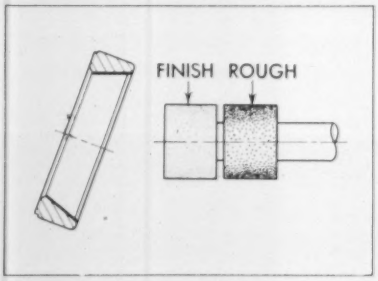


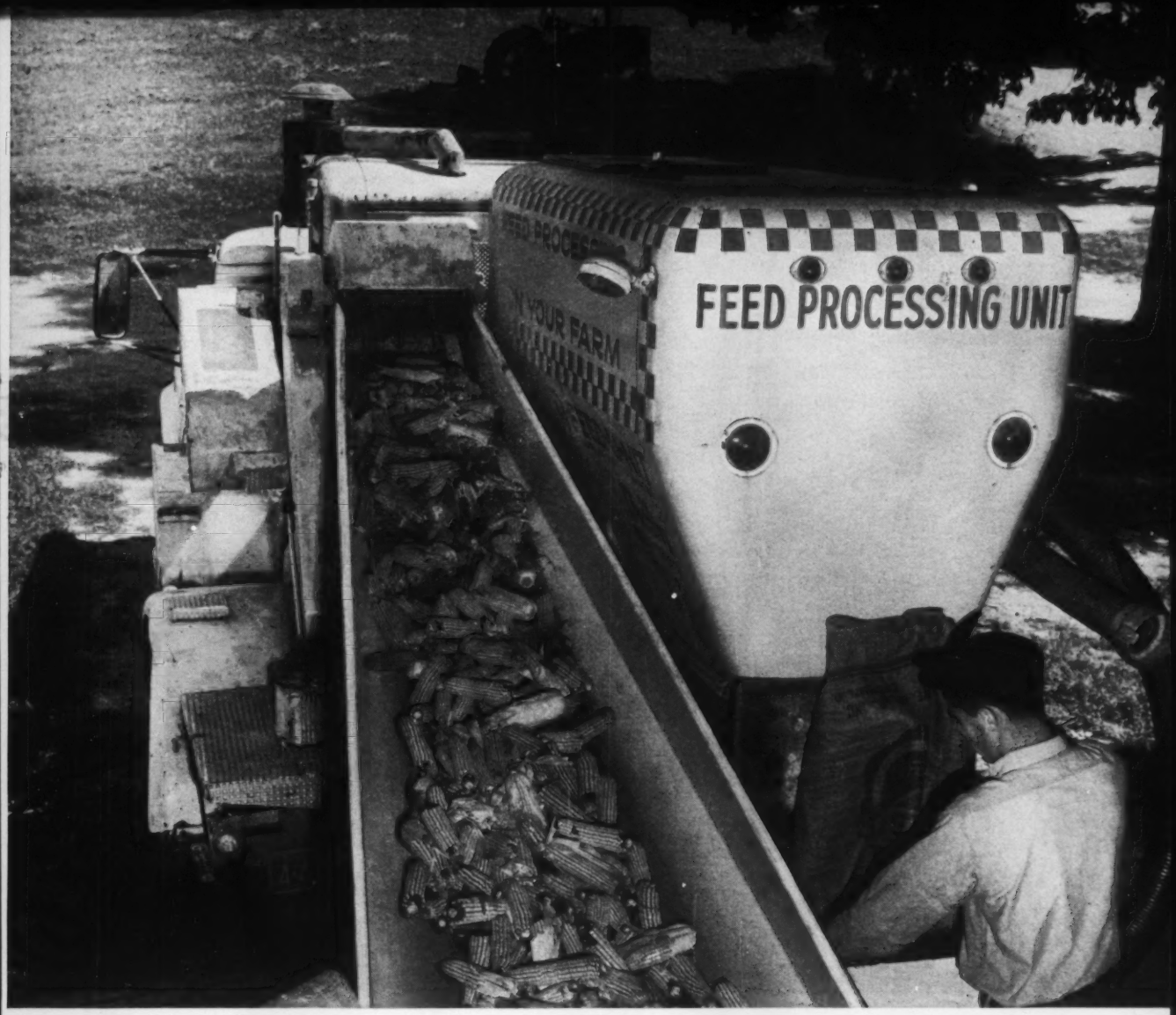
Diagram of double-wheel setup for grinding taper I.D.s of bearing outer races. The roughing wheel is mounted nearest to the wheelhead to reduce spindle deflection under heavy feeding pressure.

Your Heald engineer will be glad to tell you more about this interesting development. It **PAYS** to come to Heald.

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

WORCESTER 6, MASSACHUSETTS



Made by Daffin Mfg. Co., Lancaster, Pa., feedmobiles save many hours of valuable farm labor in processing 6,500,000 tons of feed annually, and sheet steel provides the strength and dependability that are so necessary in agricultural equipment.

Only sheets of steel could stand this tough grind

Steel *For strength . . . economy . . . versatility*

Today the crossroads feed mill is a traveling salesman. The Daffin Feedmobile moves right onto the farm, grinds the farmer's own grains and roughages, blends in the minerals and concentrates he needs, and even loads the finished feed just where he wants it—in bins, self-feeders, bags.

Traveling up to 15,000 miles per year, a busy Daffin Feedmobile averages about 15 batches of 3,000 lb each, every working day. That's a tough grind that's made to order for sheet steel. Bethlehem sheets are used in the business end of Daffin's mobile feed mills, providing plenty of strength and rugged dependability.

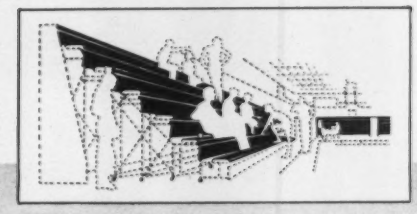
If you work with steel sheets—hot-rolled, cold-rolled, or galvanized—you can always count on Bethlehem sheets for completely dependable performance. Our engineers will be glad to discuss your sheet-steelworking problems with you.

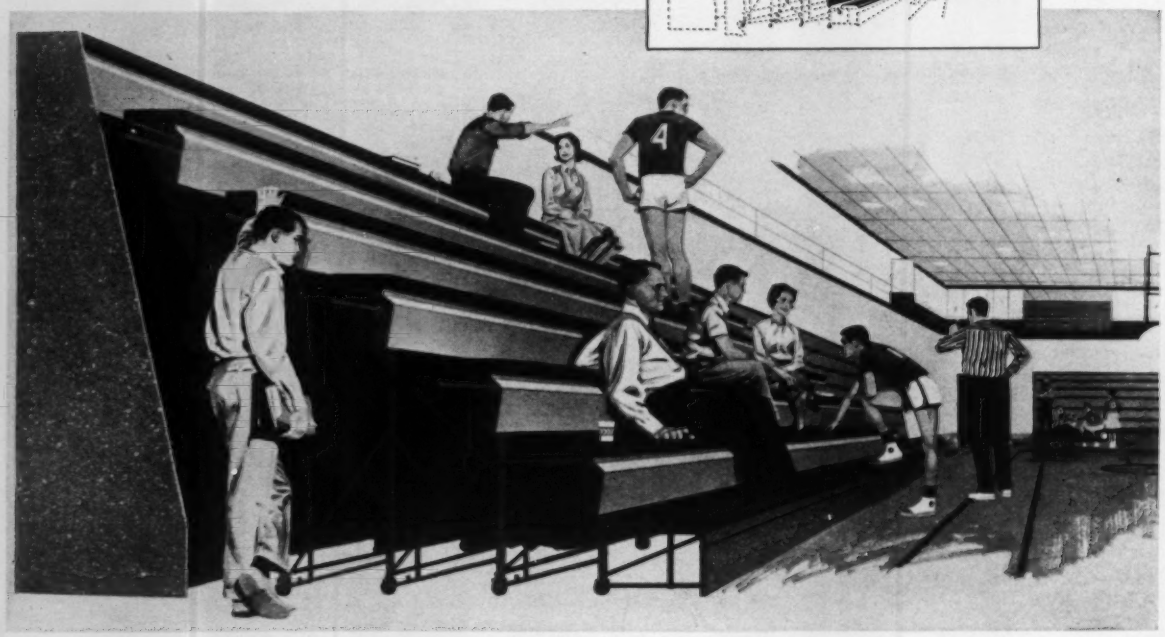
BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

FOLDING GYM SEATING MADE WITH CLAD-REX VINYL-CLAD METAL





Clad-Rex vinyl-clad metal can add to the sales appeal and profit of <u>your</u> product, too!

Brunswick, a leader in commercial and institutional furniture, has a new line of folding seating for school gymnasiums. Obviously, tough competition, styling and rugged durability were a factor in their design. Clad-Rex vinyl-clad metals are used for both seat and drop-skirt areas. Fabrication, according to Brunswick, is much the same as with bare sheet metal—except for finishing, which is not needed!

See how Clad-Rex vinyl-clad metals can help your product by contacting Simoniz Industrial Products, 11504 West King Street, Franklin Park, Illinois (Phone Gladstone 1-2323). Ask for Report 6101, "How to Use Vinyl-Clad Metal in Commercial Furniture".

Clad-Rex Vinyl-Clad Metal is a product of

RESEARCH • DEVELOPMENT • ENGINEERING

28B

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A Division of Simoniz Company

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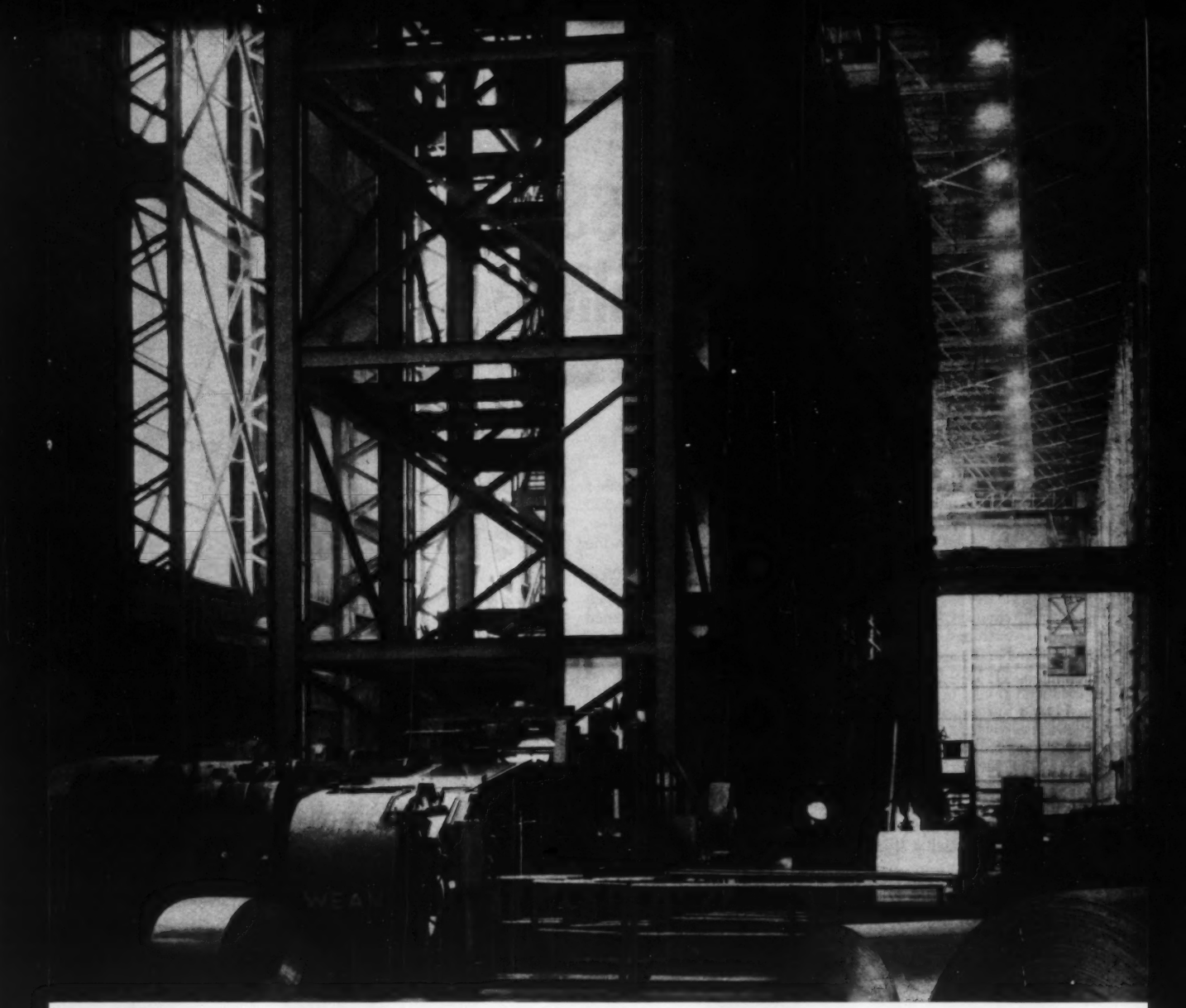

Kaiser Steel adds Wean Annealing Line in expansion of West Coast plant

This continuous tin plate annealing line marks the eighth Wean continuous processing facility installed at Kaiser Steel Corporation's Fontana, California plant, to service that company's customers for finished steels on the West Coast.

The Fontana line is capable of handling 30,000 lb. coils, with a maximum I.D. of 16½", and an O.D. of 66". Operating at speeds up to 1200 feet per minute, the new line can process strip from .006" to .015" thick, and from 18" to 38" wide.

Other Wean continuous processing equipment at Kaiser's Fontana plant includes a hot strip pickle line, two side trimming and recoiling lines, an electrolytic cleaning line, two electrolytic tinning lines, and a tin plate shearing line.

Wean's "creative engineering" can help you meet your customer requirements.

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO

LINK-BELT SS CLASS DRAW BENCH CHAIN

gives longest chain life . . . resists highest chain pull

Link-Belt SS Class draw bench chains won't give in—whether they're used on benches having capacities of 5000 lbs., 100,000 lbs. or greater. Parts are accurately machined, after hardening, by a special process that assures longer chain life on even the highest chain pull applications.

These rugged chains, of all-steel construction, are available in a variety of pitches and strengths to suit any draw bench requirement. Chains, such as the one illustrated, have hardened pins, bushings and sidebars. Pins and bushings are securely locked in the sidebars by controlled press fits. Block type chain, with hardened pins and sidebars, is also available. Pins on this chain are also securely locked in the sidebars by controlled press fits and sprocket contacting surfaces of the block links are accurately machined to assure proper tooth engagement.

For further facts, call your nearest Link-Belt office or stock-carrying distributor, listed under CHAINS in the yellow pages of your phone book. Or write for our new comprehensive Catalog 1050.

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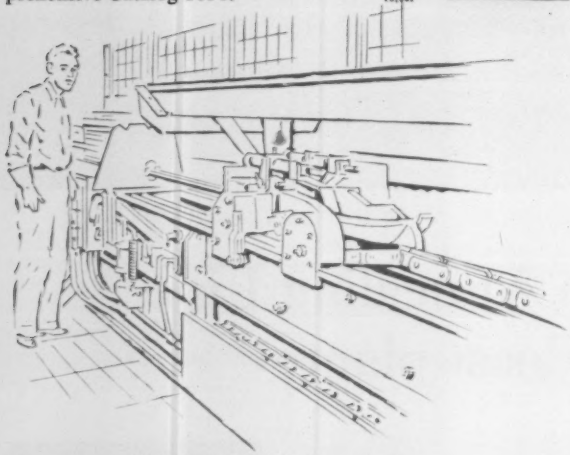

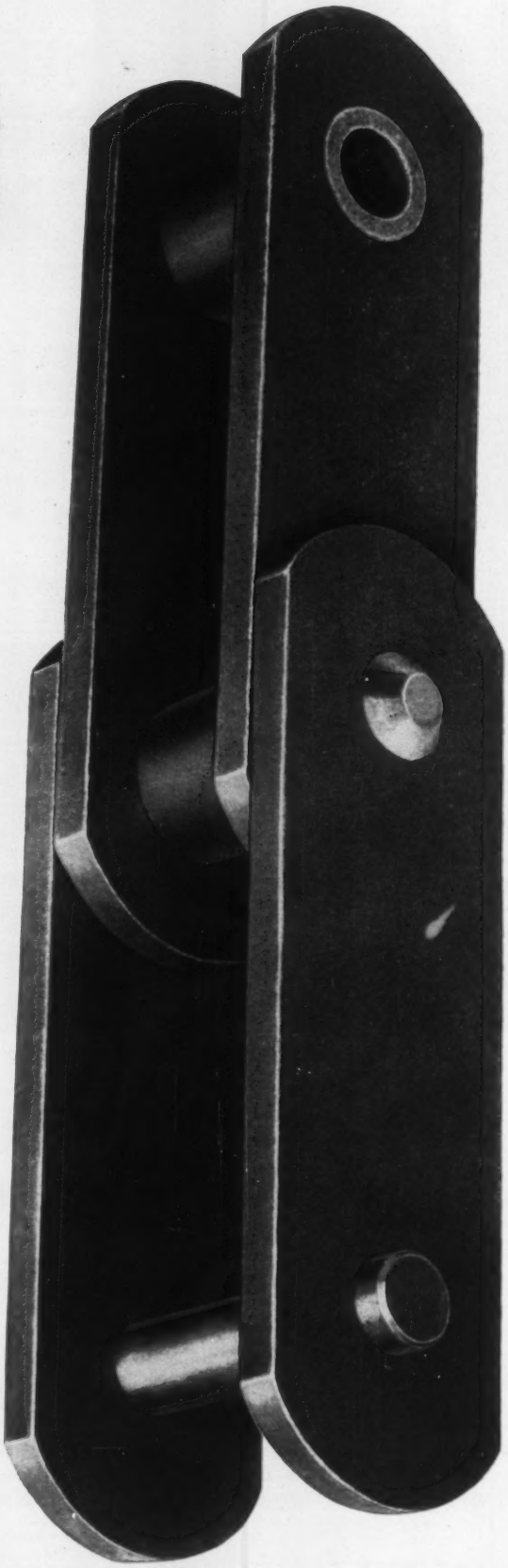

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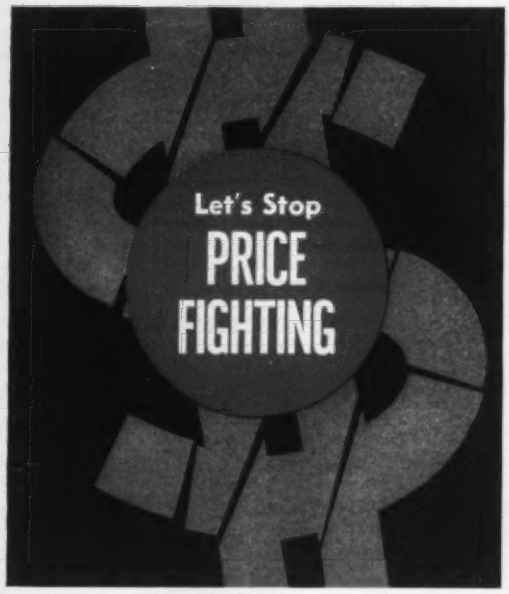

Sound the trumpets!

The editors have a special job for you coming up in the Apr. 17 issue—that's two weeks from now. Associate Managing Editor John Morgan and ten other members of the staff have been working for several weeks studying the extent in metalworking of price fighting—the uneconomic practice of cutting prices without regard to costs.

They'll be devoting nearly the entire issue to giving you an impact report on the extent, forms, causes, and effects of price fighting, plus a penetrating analysis of what you can do about it.

The problem has been with us in nearly epidemic proportions since 1955. In the July 25 issue that year, STEEL's editors started a crusade against it. They've been reporting on the matter ever since.

Mount the White Horse

The campaign against price fighting is only one of several crusades the editors have been running. Their oldest is the fight for depreciation reform, waged for a decade. For a year they have been writing about the challenges of the new world market. Their impact report on People Power (Jan. 2) was a climax in a series urging metalworking to improve its employees' efficiency.

The editors have adopted the impact report (in which a substantial portion of an entire issue is devoted to one subject) as the best form in which to deal with some of these matters.

The Apr. 17 job will be STEEL's third impact report. The first—on the new world market—appeared Sept. 5, 1960.

Bonuses

All this talk about crusades reminds us that we're right in the middle of many special studies.

Last week, the annual Facts & Figures Section appeared. This week, Associate Editor Bob Jaynes has put together STEEL's 36th annual Financial Analysis of the Steel Industry (opposite Page 46). Associate Managing Editor Vance Bell wrote the story.

For next week, Apr. 10, Associate Editor Ross Whitehead is putting finishing touches on a Welding Show section.

Two more special deals are on the griddle for May. We'll have more to say about them later.

Tom-Tom Talk

Lip reading, Indian sign language, or even the jungle drum tom-tom code may have to be man's emergency languages when he gets to the moon.

Advanced research experts at Aerojet-General Corp., writes Don Bailer of that organization's public relations department, say there will be no normal conversation on the moon. With no atmosphere like the earth's, there will be nothing in the void to convey sound waves.

As a result, radio will be the only answer, and if that konks out—no more communication, unless lip reading, sign language, or written messages are resorted to.

Explorers on the moon will find that the horizon is only 3 miles away. Beyond that horizon, even the radio won't work.

If a man wandered 3 miles away and got hurt, his radio would be useless; his shouts couldn't be heard; a balloon could not rise to signal distress, nor could smoke signals. But a tom-tom might work. Using the surface of the moon itself as a drum, he could "beat" it by firing pistol shots into it as a prearranged SOS.

Seismograph equipment, like that used to record earthquakes, could pick up the SOS. When our man got back to his moon home, he wouldn't have to listen to his wife's scolding—a notable example of a silver lining in a place without even a cloud to go with it.

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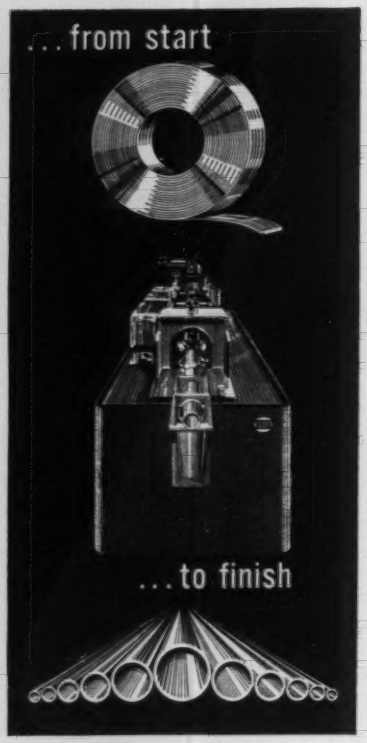

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OILGEAR 40 Years of Fluid Power

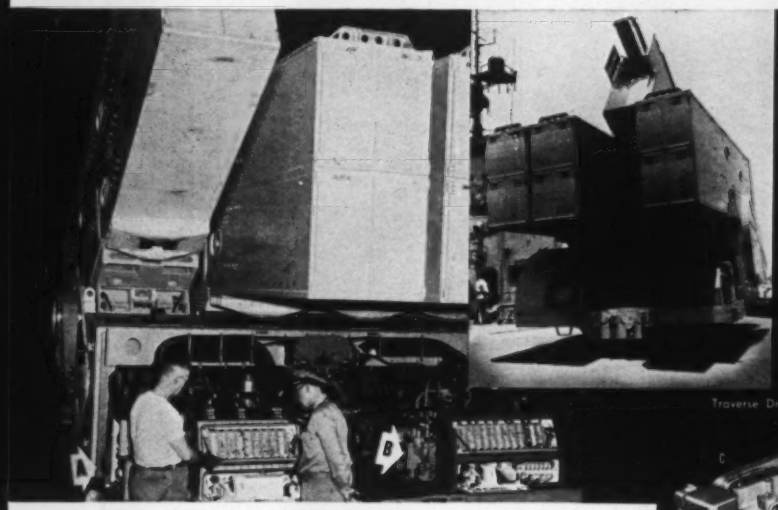
Report No. 11,400 From Oilgear *Application-Engineering* Files

HOW OILGEAR ELECTROHYDRAULIC SERVO-VALVE-CONTROLLED DRIVES AIM ASROC* MISSILE LAUNCHERS IN RESPONSE TO LOW-POWER SIGNALS FROM SHIPBOARD DIGITAL COMPUTERS.

**ASROC (Anti-Submarine ROCket) — the Navy's deadliest, integrated, anti-submarine weapons system — consists of 4 major parts: an underwater sonar detection device; an electronic, digital, firecontrol (aiming) computer; a "pepper-box" type, 8-missile launcher; and ASROC missiles. Within seconds after sonar detection of a hostile submarine, the computer charts its course, speed, and range — correlated with the ASROC-equipped ship's course, speed, and roll. The resultant computer signals command the launcher to traverse and elevate instantly to accurate "aim" position, and continue to "track" from subsequent computer command signals. The ship commander merely pushes a button to fire either rocket-propelled, homing torpedos or depth charges.*

PROBLEM: Power and control for both the traverse and elevation drive systems to "aim" ASROC missile launchers in response to direct, low-power, electrical command signals from a digital firecontrol computer.

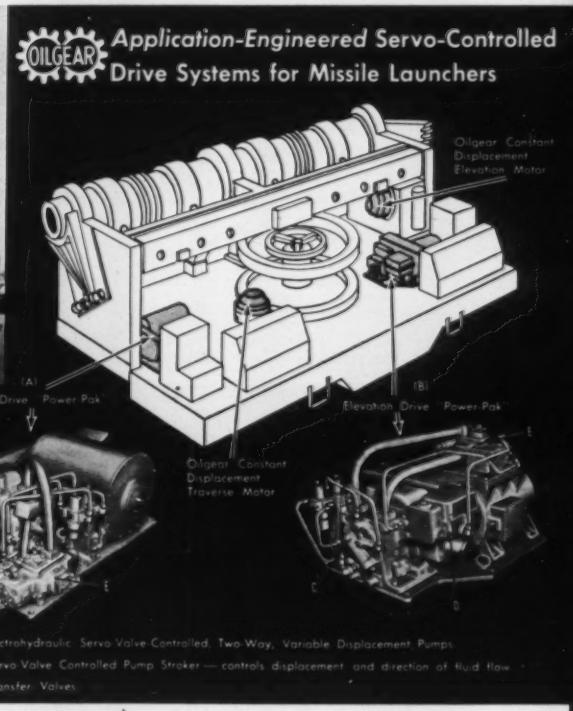
REQUIREMENTS: 1. High traverse and elevation speeds in either direction, with shockless reversal, to bring launcher "on target" — rapidly. 2. Fast, accurate control response for high-speed "homing." 3. Precisely controlled, low variable speeds for "tracking." 4. Entire drive and control systems to occupy a minimum of space within the launcher base. 5. Dependability — "no time-out permitted" — a rigid requirement for fleet use. 6. Unitized assemblies preferred, to facilitate installation and replacement.



Official Photos — U.S. Navy. Actual launcher performance data is classified information.

ABOVE: ASROC missile launcher being checked at U.S. Naval Ordnance Plant, York, Pennsylvania. Arrows indicate traverse (A) and elevation (B) Power-Paks. **INSET:** ASROC launcher ready to fire aboard U.S.S. Norfolk. Each of the 8 cells serve as missile stowage magazines and launchers — all traverse as a unit . . . each over/under pair of cells elevate individually. 360° launcher traverse is possible, but a quadrant is blocked to protect ship's superstructure. Missiles weigh about 1,000 lbs., are about 15 ft long. Launcher base sketch, right, approximates position of Oilgear Drives.

SOLUTION: With Oilgear's experience in meeting the speed, control, and precise turret and gun performance requirements for U.S. Army tanks, howitzers, and anti-aircraft guns — this missile launcher application was a "natural" for Oilgear *ANY-SPEED* Drives — and the alert, accurate response of Oilgear's Electrohydraulic Servo-Valve-Controlled, Two-Way, Variable Displacement Pumps. Amplified signals up to 5-watts actuate drive controls. Cushioned, full-speed drive reversal. These small, rugged, Oilgear *ANY-SPEED* Pump and Motor Drives easily convert output from constant speed electric motors into the exact, required traverse and elevation speeds, direction, and torque . . . even under high overload conditions. An automatic feedback control compensates for load, voltage, or viscosity changes to accurately maintain computer-selected speeds. Torque transmitted automatically increases or decreases to a point just sufficient to overcome resistance. There's no "wire-drawing," or bypassing of fluid to generate heat or waste power. Both systems are totally enclosed, automatically protected against overload, pressure and flood lubricated to assure long, dependable, maintenance-free, service life.


OILGEAR Application-Engineered Servo-Controlled Drive Systems for Missile Launchers
Oilgear Constant Displacement Elevation Motor
(A) Traverse Drive Power-Pak
(B) Elevation Drive Power-Pak
Oilgear Constant Displacement Traverse Motor
(C) Oilgear Electrohydraulic Servo-Valve-Controlled, Two-Way, Variable Displacement Pumps
(D) Oilgear Servo-Valve Controlled Pump Stroker — controls displacement and direction of fluid flow
(E) Oilgear Transfer Valves

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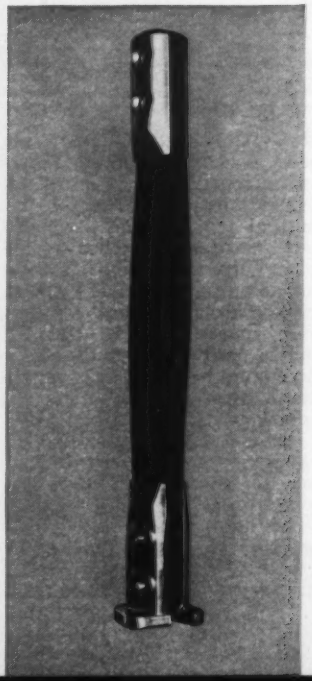

KAMAN AIRCRAFT CORPORATION, Bloomfield, Connecticut, uses Republic Titanium in the rotor system of their HU2K "SEASPRITE" Helicopter. 1½″ x 18″ titanium (type RS140) strips are assembled in bundles of 88 and machined into retention straps capable of working through a torsion angle of ±13°. Each strap provides a minimum tensile strength of 155,000 psi.

MORE STRENGTH, MORE VALUE, MORE MILES

Why Republic Alloy Steel is specified for critical transmission components

One good example is the alloy steel planetary ring gear above. Produced by the Warner Gear Division of Borg-Warner Corporation, Muncie, Indiana, this part must withstand severe shock, strain, impact, and wear.

Republic Hot Rolled Alloy Steel, Type 4047, was selected to assure strength and toughness with the best possible degree of machinability. The alloy is forged, rough machined, broached, hobbed, and heat treated. Uniform response to heat treatment provides hard surfaces around tough cores, and assures maximum resistance to abrasion, friction, and wear.

Records prove that the uniformity of this alloy steel has reduced reject rate and scrap loss. This, along with the high machinability, is holding unit cost of the planetary ring gear to an absolute minimum.

Our metallurgists will help you select and apply the most economical alloy steel capable of meeting your requirements. For information, contact your nearest Republic sales office or mail the coupon below. Please indicate if you would like a metallurgist to call.

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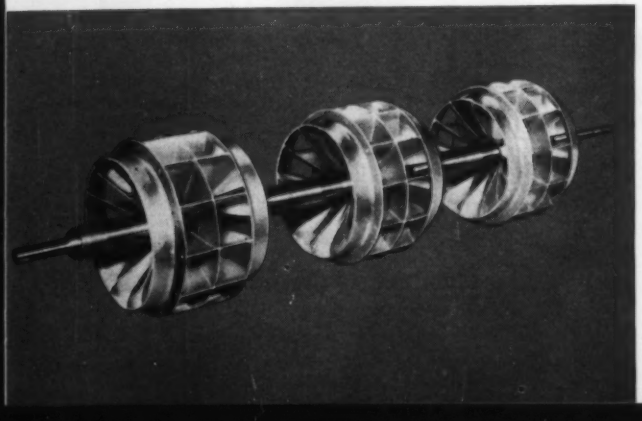
BUFFALO FORGE COMPANY uses Republic ELECTRUNITE® Mechanical Tubing in the production of rotor shafts that require exact balance to maintain high operating efficiency. Up to 94″ in length, these shafts turn at 1110 rpm. Close tolerance concentricity of ELECTRUNITE meets requirements without costly machining. Available in carbon and stainless steel. Mail coupon for details.



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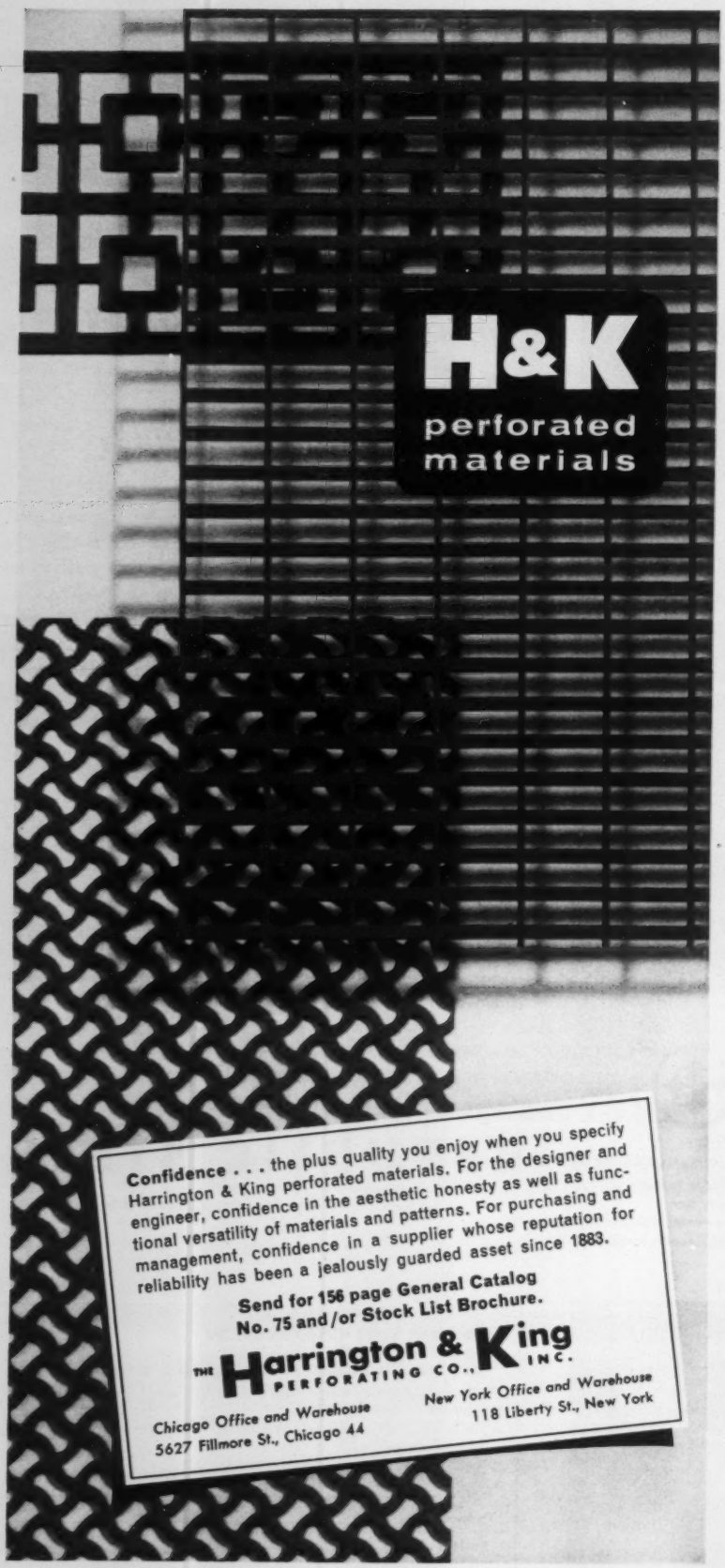
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CALENDAR
OF MEETINGS

Apr. 24-27, Metal Powder Industries Federation: Annual meeting and show, Sheraton-Cleveland Hotel, Cleveland. Federation's address: 60 E. 42nd St., New York 17, N. Y. Executive secretary and treasurer: Kempton H. Roll.

Apr. 26-27, Metallurgical Society of AIME: Technical conference on high temperature materials, Pick-Carter Hotel, Cleveland. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Apr. 30-May 3, National Screw Machine Products Association: Annual meeting, Somerset Hotel, Boston. Association's address: 2860 E. 130th St., Cleveland 20, Ohio. Executive vice president: Orrin B. Werntz.

May 1-2, American Zinc Institute Inc.: Joint annual meeting with Lead Industries Association, Drake Hotel, Chicago. Institute's address: 292 Madison Ave., New York 17, N. Y. Executive vice president: J. L. Kimberly.

May 2-3, Lead Industries Association: Annual meeting, Drake Hotel, Chicago. Association's address: 292 Madison Ave., New York 17, N. Y. Secretary-treasurer: Robert L. Ziegfeld.

May 7-10, American Institute of Chemical Engineers: Joint AIChE national meeting with Chemical Engineering Division, Chemical Institute of Canada, Cleveland. Institute's address: 25 W. 45th St., New York 36, N. Y. Secretary: F. J. Antwerpen.

May 7-11, American Society of Mechanical Engineers: Hydraulic Division conference, Queen Elizabeth Hotel, Montreal, Que. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

May 8-9, American Society of Mechanical Engineers: Lubrication symposium, Hotel Deauville, Miami Beach, Fla. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

May 8-9, Society of the Plastics Industry Inc.: Canadian section conference, Sheraton-Brock Hotel, Niagara Falls, Ont. Society's address: 250 Park Ave., New York 17, N. Y. Director of public relations: Langdon P. Williams.

May 8-10, American Society of Lubrication Engineers: Annual meeting and exhibit, Chase-Park Plaza Hotel, St. Louis. Society's address: 5 N. Wabash Ave., Chicago 2, Ill. Executive secretary: Calvert L. Willey.

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In cutting action, wheel life and production economies, Simonds grinding wheels give you top value. The reason? Control . . . complete quality control starting with abrasive grain manufactured by Simonds Canada Abrasive Co. Ltd. . . . single-management quality control extending to the finished wheels . . . single-source quality control backed by our technical engineering service . . . in short, ground-to-grinding control that gives Simonds wheels that *extra* efficiency to give your products *extra* value. New illustrated catalog gives the specific advantages. Write for copy on your letterhead.

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USS Stainless Steel puts the gleam in the prospect's eye

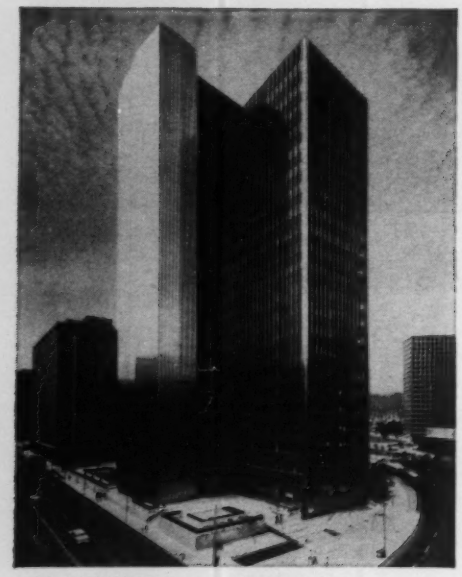
Still standing head and shoulders above many newer ideas in selling today is an old truth—if a product "looks" better, it probably will sell better. This commercial virtue—*appearance*—is responsible for *first impressions*. And first impressions often determine which products move into use or remain in inventory.

If a good-looking product is well designed with a better material, it enjoys a marketing phenomenon—a competitive edge. This competitive edge is a tradition with Stainless Steel. For when the product goes to Stainless Steel, it goes first class. In fact, to lay it on the line, there is a deep respect for Stainless Steel that extends from skyscrapers to soup spoons.

There are those in the market place who know the value of the appearance and quality of a material. They will invest more—and more quickly. They appreciate the fundamental fact that appearance and quality are worth more. Compromise is alien to this metal. From its precisely controlled start in the electric furnace to its impervious finish, Stainless Steel awaits the imaginative designer who wisely employs its inherent qualities to turn prospects into buyers.

In brief, Stainless Steel delivers the edge for the key force—the salesman. Everyone prefers quality. And there's enough wisdom—and demand—in the market place to pay for it. We welcome a chance to work with you to create new products and establish new markets for products made from Stainless Steel. Write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

No other metal makes such a material difference in so many applications.



A beautiful building . . . it's Stainless

Number Four Gateway Center stands at the tip of Pittsburgh's Golden Triangle, a shining compliment to the City of Steel. And it will *keep* its mint-fresh beauty, because it's clad in Stainless Steel. This building is a 22-story reflection of the changing moods of the city around it. Any business firm would be proud to call Gateway Four home—and many already do, for it was substantially rented even before completion.

This Stainless trim has a job to do

If a car has Stainless Steel rub molding along the side, the owner is fortunate. This molding is tough, and its gleam can always be restored with the wipe of a cloth. This is quality in depth. It will stay bright and new-looking for the life of the car, too. In addition to adding a bright touch of beauty and quality, this Stainless molding does its primary job—fending off finish-scratching encounters with the careless—better than any other material.

You can tell a lot about a person by his luggage

The smart traveler carries luggage trimmed with Stainless Steel. A suitcase might get good care at home, but in the rough and tumble world of travel it is often subjected to bangs and bumps. Besides adding an extra touch of quality and beauty that catches the consumer's eye, Stainless trim will take lots of knockabout service and still stay undented because of its great strength.

Stainless is for sitting on, too

Notice the modern design of the base of this office chair. It's made possible because Stainless is strong and can be fabricated into unusual shapes. It's a good example of what is possible when designers take full advantage of the unusual strength of Stainless Steel. Incidentally, this is a good example of "component" design. This same type of base can also be used as the pedestals for desks or tables.

Men like Stainless at home...

Stainless Steel brightens up leisure moments. Take this home bar, for instance. It's equipped with stirrers, shakers, openers, ice crushers, strainers, etc., all made of Stainless Steel; and all are beautiful as well as functional. Because they're Stainless, they have the permanent gleam of beauty and quality.

...and so do their wives

In the kitchen and in the dining room Stainless Steel makes a woman's world a more attractive, practical place. She can set a formal table with Stainless—graceful flatware, gleaming pitchers, candelabra and many other decorative items. Cooking is clean with Stainless Steel utensils that stay smooth, shiny, and stainfree. That's why Stainless is used in the better restaurant kitchens—and in the better home kitchens, too.

USS TRADEMARK **United States Steel**

"Our great new
SALES MANAGER

'61 Mercs are built to give the finest performance in our history—so we naturally depend on **G.S. Gears** for our transmissions!"

"I say 'naturally', because G.S. Gears are old friends at Kiekhaefer. We've used several millions of them in the Mercury motors we've built in the last twenty-one years—and they've given us a remarkable record of trouble-free power transmission."

Positive power control has always been a big "Merc" feature, whether in full forward-neutral-reverse types like the new 70 hp Merc 700 and 80 hp Merc 800, or direct reversing engines, the 70 and 80 hp Merc 700 and 800; so they are mighty concerned with the way transmissions hold up in actual use—and you wouldn't believe the tasks some customers will set for their Mercs!

That's why Kiekhaefer is glad to know that they can keep counting on G.S. Gears for the same quiet, positive gear action their customers are used to. It's that kind of satisfaction that brings customers back again and again when they're ready for new motors.

Of course, this reliability means a lot to the plant, too. Production men know they can keep right on rolling without slowdowns—the G.S. Gear sets are *right*, and they're there when needed. You see, G.S. is strictly precision-minded—after all, we produce all kinds of gears from the hefty, heavy-duty bevels used in powerhouse outboards to tiny, delicate spurs for the most complex instrumentations. But we have production know-how, too, and the equipment and personnel to pour out gears in a continuous flow without wandering from specs. And G.S. experts are always available to work with your engineers on developing new ideas or better methods.

So, if your products involve small Gearing, you can't do better than to call in G.S. — it's great to have a source that keeps both your plant and your customers happy!

YOU'LL FIND G.S. GEARING IN TOP QUALITY PRODUCTS LIKE THESE . . .

Adding Machines • Aircraft Carburetors & Fuel Metering Systems • Aircraft Instruments and Radios • Automatic Musical Instruments • Automation Systems • Business Machines • Check Signing & Protecting Machines • Clippers for Barbers, Animal Shearing & Hedge Trimming • Cloth Cutting Machines • Coin Changers & Counters • Communication Equipment • Control Mechanisms • Electric Fans • Electric Motors • Floor Polishers, Sanders, Scrubbers, Sweepers • Food & Drink Mixers, Blenders • Home Appliances • Lawn Sprinklers • Machine Tools • Meat Tenderizers, Grinders, Slicers • Military Equipment • Motion Picture Cameras & Projectors • Optical Instruments • Outboard Motors • Pneumatic Production Tools • Radio & Radar Tuning Assemblies • Radio Anti-backlash Gears • Range Finders • Record Changers • Sewing Machines • Steel Strap Stretchers • Step Switches • Tapping, Drilling & Threading Equipment • Telephone Dials • Television Sets • Thermostatic Controls • Typewriters • Vending Machines • Washing Machines.

SEND FOR G.S. *illustrated folder! See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. Folder contains 23 pictures of Small Gears, plant view, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!*

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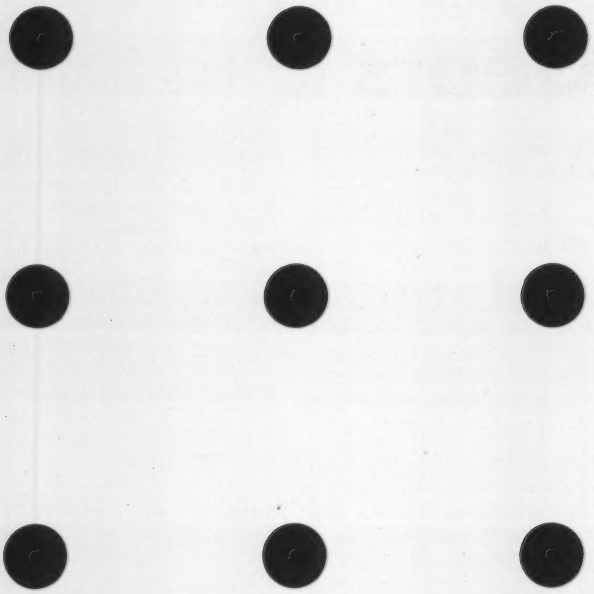
(Advertisement)



Can you connect these dots thru their centers using four straight lines without your pencil leaving the paper?

There's no *obvious* solution to this problem. But a look beyond the obvious will produce a very simple answer.

Going beyond the obvious *often* pays dividends. At Ryerson we've made a science of this and call it *Metalogics*.

How does Metalogics work for you? It helps you value-analyze any kind of problem in the selection and application of steel, aluminum, industrial plastics and metal-fabricating machinery. It searches out money-saving and money-making ideas. And then it follows through with day-in, day-out service on steel and aluminum from stock that also goes "beyond the obvious" in caliber and scope and dependability.

Ask your Ryerson representative to show you how you can get the greatest possible value from this unique Ryerson service. He'll be glad to tell you—and you may be very glad you asked. (Incidentally, for answer to dot-connecting problem, see page 135.) Joseph T. Ryerson & Son, Inc.—Service Center Plants Coast to Coast.

Kennedy Orders Antitrust Review

Attorney General Robert Kennedy and Chairman Paul R. Dixon of the Federal Trade Commission will be working together closely. The Justice Department has asked the FTC to check into 56 antitrust cases decided since 1940 to find out if the rulings have been followed. No company names have been announced, but STEEL's sources say major industry groups will be checked. Steel companies, for example, are involved in a 1951 consent decree not to fix prices.

USW Trying to Organize 13 Ohio Plants

A campaign to organize 33,250 workers at Cincinnati Milling Machine Co., Armco Steel Corp.'s Middletown plant, National Cash Register Co., and ten smaller firms will be launched soon by the United Steel Workers. Al Whitehouse, USW district director, says the USW believes the time is right . . . due to the number of employees laid off partially because of automation.

Automation-Unemployment Barrage Begins

Look for a speedup in a campaign being waged by some unions, some politicians, and other elements to link unemployment to automation. Initial thrusts have been made. And so have some counterattacks. Economist Paul Samuelson, the MIT professor who headed President Kennedy's task force last fall, suggests that unemployment may remain close to 6 per cent even with an economic rebound, but he says he sees no evidence that automation is seriously increasing long term unemployment. He testified before a House Labor committee studying automation. The Kennedy Administration has asked Congress for $325,000 to finance a study.

CF&I's Franz Asks Broader 'Buy American' Policy

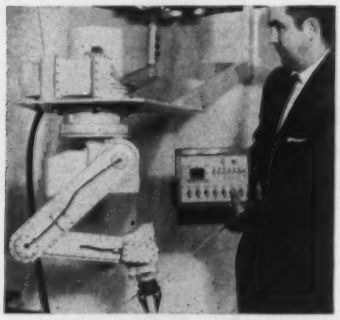
A. F. Franz, president, Colorado Fuel & Iron Corp., reports his firm has appealed to the President through senators and congressmen to re-establish the 25 per cent differential on government bids which was in effect from 1933 to 1954. It allowed the federal government to award contracts to U. S. firms over foreign competitors if the U. S. price was not more than 25 per cent higher. The present differential, set by executive order in 1954, is 6 per cent.

High Unemployment Areas Reach Record 101

The Labor Department has added 25 new industrial areas to the list of those having substantial unemployment, bringing the total to a record 101. The previous high was 89 at the low point of the 1958 recession. The department

classifies 150 areas monthly; those with 6 per cent or more unemployment are put on the list. In 9 out of 10 areas, employers expect some seasonal pickup in jobs during the next two months.

Ocean Floor Hunter Gets Movable Arm



When the Navy's bathyscaph *Trieste* makes its next trip to the ocean's floor, it will have a movable arm that can pick up samples. Developed by General Mills Inc., the manipulator will provide six motions—grip; wrist, elbow, and shoulder bending; and wrist and shoulder rotation—even under pressures of 9 tons psi.

Consumers Hold Upturn Key, May Turn It

When a business upturn appears on the horizon, the consumer's attitude takes on tremendous significance. He can accelerate or retard the climb. This time he's likely to accelerate it, the findings of the University of Michigan's latest survey indicates. Despite the dip in personal income and high unemployment, consumer sentiment did not change significantly for the worse during January and February. There's widespread confidence in a business upturn. About as many people plan to buy houses now vs. a year ago, though considerably fewer plan to buy cars and make home improvements. Intentions to buy major appliances are also under the year ago level.

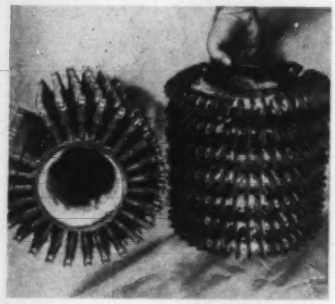
Recession Is Over, Says STEEL's Panel

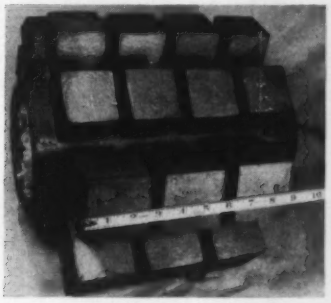
The recession is over and recovery will take shape this quarter. That's the consensus of STEEL's Panel of Economic Consultants. They say gross national product will rise to a record annual rate of $528 billion by the first quarter of 1962. For further forecasts, see Page 41.

Air Pollution: Big Headache, Big Market

"There's probably no single phenomenon which affects man in more different ways than air pollution," says Vernon G. MacKenzie, chief, Division of Air Pollution Control, U. S. Public Health Service. The clamor for cleaner air is emotion charged: Municipal hassles, misunderstanding of standards, and the possibility of federal control are among factors. Some 6000 communities in the nation have contaminated atmospheres. Metalworking's stake is two-pronged: It must control its pollution; the problem offers market opportunities (Page 37).

Thin Gates Beget Heavy Castings





Recent developments in shell mold casting permit heavy parts to be made with a light gating system. In some cases, the nonproductive metal is as little as 30 per cent of the weight of the finished part. In the photo at right, sound cubes 2½ in. thick and weighing 4½ lb each have been cast on a sprue averaging only ⅜ in. thick. For more information, see Page 86.

Steel Imports and Exports Fall

Exports of steel mill products in January fell to 132,000 tons, the lowest level since December, 1959. Imports slipped to 145,000 tons, the lowest level since June, 1958. A drop of 23,000 tons from the December figure for rebars accounted for most of the import decline, reports the Commerce Department.

Financial Analysis of the Steel Industry

The U. S. steel industry made more steel and less money last year than in 1959. Ingot output was up 6.24 per cent, but net profit was down 3.61 per cent. For complete details, see insert opposite Page 46.

Miniature Pump Wins Award

Vickers Inc. won a certificate of excellence in the 1960 Miniaturization Awards competition (sponsored by Minature Precision Bearings Inc.) for this subminiature vane pump cartridge. The unit weighs 1 oz, is ¾ in. in diameter, offers new design flexibility to makers of fluid systems. Bulova Watch Co. won top prize. Other certificate winners: Spard Div. of Electric Autolite Co.; General Electric Co.'s Receiving Tube Dept.; A. W. Haydon Co.; Hughes Aircraft Co.; IBM Corp.; Sandia Corp.; Electro-Optical Systems Inc.; Ethicon Inc.; and the University of Vermont's College of Medicine.

Sohio Develops Concrete that Floats

Metals face some new competition in the form of little glass bubbles developed by Standard Oil Co. (Ohio). The bubbles are designed to be used as a whisper-weight aggregate in cement or a bulk filler for plastics. It makes possible

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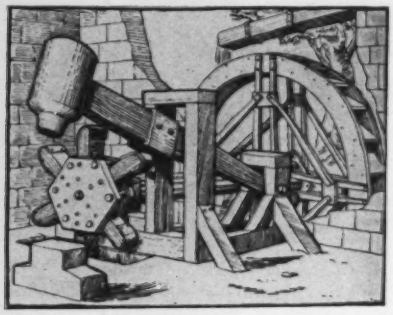
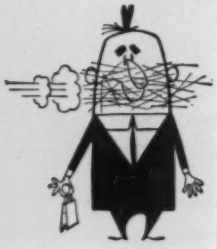
concrete that floats and plastic moldings with high strength to weight ratios. The colorless spheres are about 0.002 in. in diameter. They weigh about one-third as much as water. And they remain unchanged at temperatures up to 1200° F. The glass is immune to hydrocarbons, water, and dilute acids or alkalies.

What's High Energy Rate Forming?



Circa 1500, the tilt hammer (left) was considered a high energy method. Today, the term is applied to techniques like explosive forming (right). Who knows about tomorrow? You can be sure, however, that high energy rate forming methods will get broader usage. For example, scientists at Battelle Memorial Institute say they have good potential in the production of basic extrusions, rods, and bars (see Page 82).

Straws in the Wind



Fairmont Aluminum Co. says it has perfected a process for joining aluminum sheets to stainless steel by molecular bonding . . . S. K. Wellman Co., Cleveland, will test market a new powdered metal brake lining for autos in Los Angeles . . . The Bureau of Reclamation plans to purchase "major portions" of aluminum conductor and steel overhead ground wire for transmission lines from firms in depressed areas . . . Prime government contracts awarded to small firms in February under the Small Business Administration's procurement program were 72.5 per cent greater in value than those awarded during February, 1960 . . . Foundry Equipment Manufacturers Association's new order index rose to 123.7 in January from 101.2 in December (1947-49 = 100).

Metalworking Pulse

The Business Trend: STEEL's industrial production index held at 145 for the week ended Mar. 25. Increases in auto and steel production and carloadings were not quite enough to push the barometer to the 146 mark. **Autos:** Increased optimism in motordom gave output an upward push for the second straight week. **Steel:** The ingot rate is expected to continue creeping ahead.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended Mar. 25 . . . . 145†
  Year ago 175
  Details on Page 57

- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Apr. 1 . . . 96,000*
  Year ago 147,830
  Details on Page 54

- **STEEL INGOT OUTPUT (TONS)**
  Week ended Apr. 1 . 1,620,000*
  Week ago 1,611,000
  Details on Page 122

†Preliminary. *Estimated.

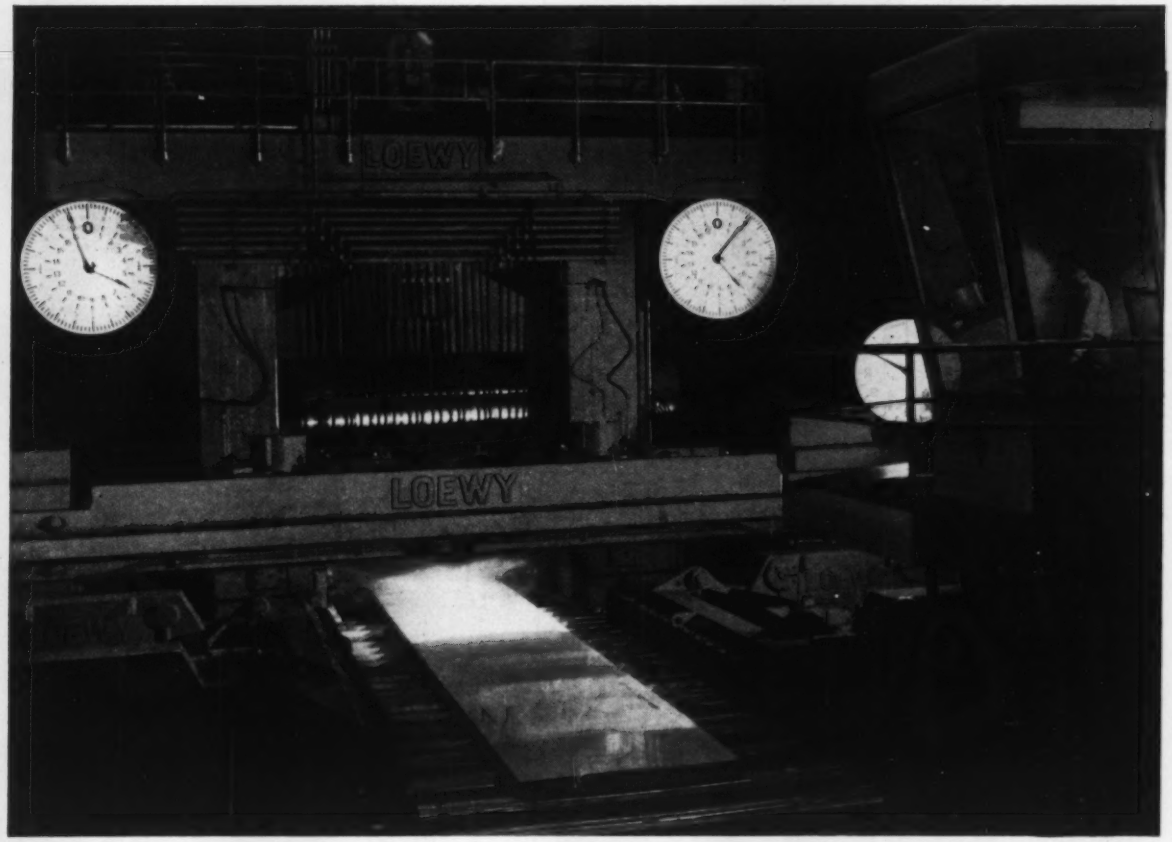
With B-L-H Loewy slab and plate mill... automated operation plus minimum downtime!

Cite the most desirable qualities in modern metal-forming equipment—high productivity, automated operation, low maintenance cost, minimum downtime—and, in a very real sense, you are describing the B-L-H Loewy 4-high universal slab and plate mill.

Programmed punch card operation controls the adjustment of screwdown, edger and sideguards in any pre-selected sequence, thus relieving the operator of the many split-second decisions usually required. Edger is an underdriven, close-coupled, vertical unit. Rolls can be readily removed without disassembly of spindles or any associated equipment. Horizontal rolls are changed automatically.

With our newly integrated facility, our engineering and manufacturing team can meet your most exacting requirements. For further information, write us at Dept. B-4.

Entry side of 110-in. 4-high reversing hot mill with underdriven edger designed and built by B-L-H for a West Coast metals producer.



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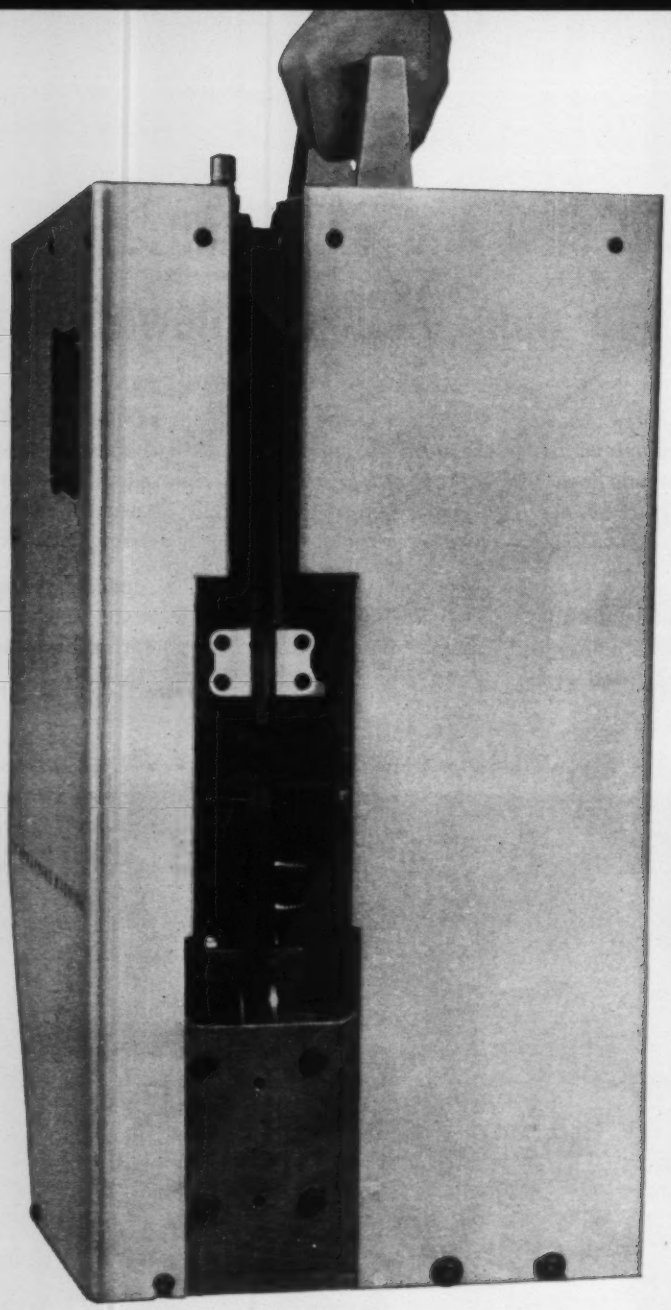

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the world's first strapping machine with

FULL-SIZE PERFORMANCE...

PINT-SIZE PRICE

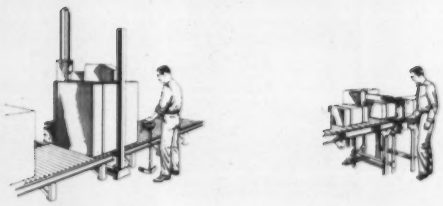
THE REVOLUTIONARY **F7**

. . . so *compact*, we can carry it right into your plant . . . so *complete*, it does everything you want a powered strapping machine for: fast feeding, tensioning, sealing and cutting. And so *conservative in cost!*

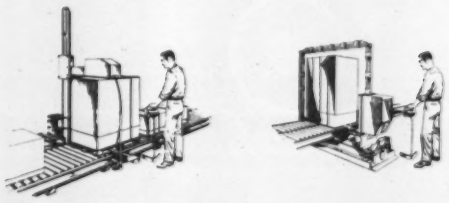
The new F7 is not a stripped down facsimile of a larger machine. Its surprisingly low initial cost and operating economy are engineered into the strapping mechanism—a 75 pound, self-contained unit that doesn't rely on complex (and costly to service) electronic circuits. You can adapt it for any regular duty strapping job, equip it for the exact degree of automation you desire (at right are a half dozen actual applications).

Now, even modest volume operations can discard outmoded methods. Big users can set up additional strapping lines at a fraction of their former cost. And everyone can give production bottlenecks the slip—the low-cost F7 strapping mechanism can be replaced with a standby in a few minutes!

Call your Acme Idea Man for a quick *carry-in* demonstration. See how the new F7 can handle your packaging operation at a greater profit. Or, return the coupon for full facts.



A HALF DOZEN WAYS



THE F7 CAN LOWER

PACKAGING COSTS

ACME STEEL **IDEA LEADER IN STRAPPING**

ACME STEEL COMPANY
Dept. SBS-41, 135th St. & Perry Ave.
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☐ I would like an F7 demonstration in my plant.
☐ Send complete information on the new F7.

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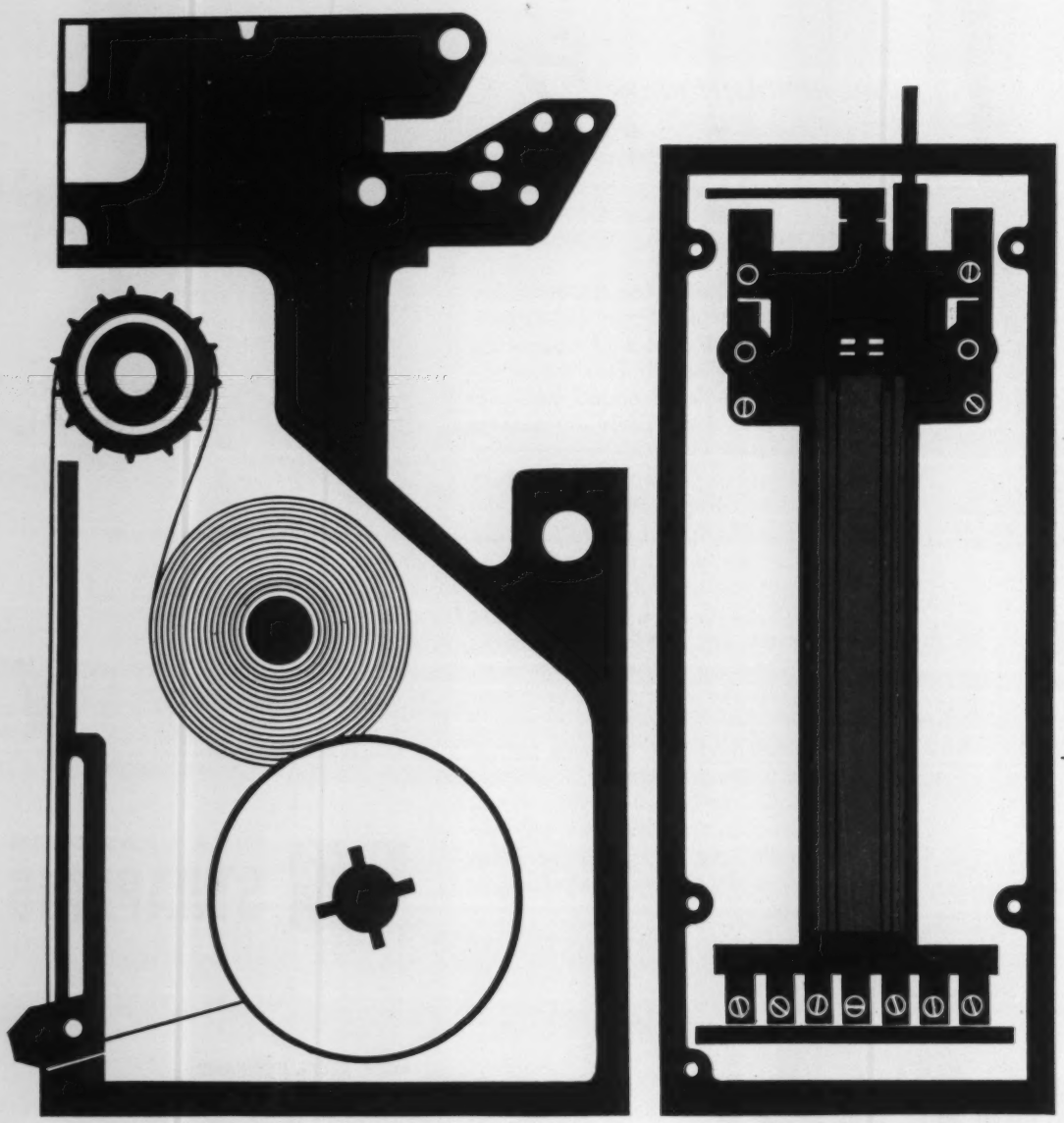
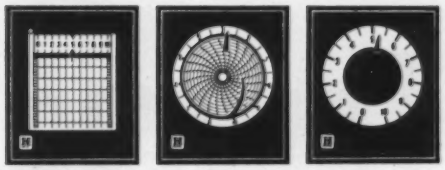
ALL-NEW *ElectroniK 17* POTENTIOMETERS



NO SLIDEWIRE, NO SLIDEWIRE PROBLEMS. The unique *STRANDUCER* rebalancing element, an innovation in potentiometer design, replaces the conventional slidewire. It works on the proven strain gage principle and consists of four looped wire strands which form the resistance legs of a Wheatstone bridge. Both *STRANDUCER* and pen carriage are linked to the potentiometer balancing motor. A change in electrical input causes the balancing motor to change the tension—and electrical resistance—of the *STRANDUCER*. This in turn causes the balancing motor to rebalance the bridge, at the same time repositioning the instrument pen or pointer. The *STRANDUCER* is unaffected by corrosive atmospheres and has no contactors. It has unusually long life and infinite resolution and is unaffected when the instrument is subjected to ambient temperatures up to 130° F.



HAVE NO SLIDEWIRE, NO SLIDEWIRE PROBLEMS

Revolutionary STRANDUCER rebalancing element replaces slidewire . . . has unusually long life, infinite resolution*

Here is a totally new kind of potentiometer with a totally new kind of measuring system. The *STRANDUCER* rebalancing element replaces the slidewire, and sets a new high standard for potentiometer performance. The new *ElectroniK 17* potentiometers have a calibrated accuracy of ±0.25%.

In addition, modular construction makes *ElectroniK 17* instruments easiest of all potentiometers to operate, convert and maintain. Complete interchangeability of components cuts service downtime and minimizes spare parts stocking requirements for these advanced potentiometers.

You can get *ElectroniK 17* instruments as strip or circular chart recorders or circular scale indicators. You can get electric contact control with up to 8 contacts. All control units are of convenient plug-in type.

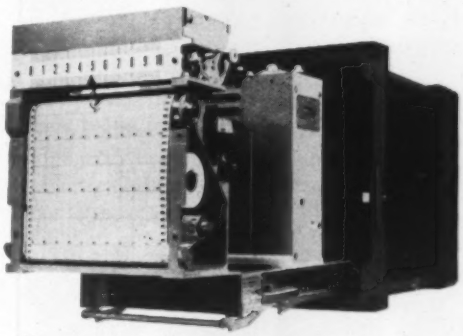
ElectroniK 17 is one of the great advances in potentiometry, and you should have all the eye-opening facts about this new class of instruments. For complete details, call your nearby Honeywell field engineer, or write MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.—In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

First in Control

SINCE 1885

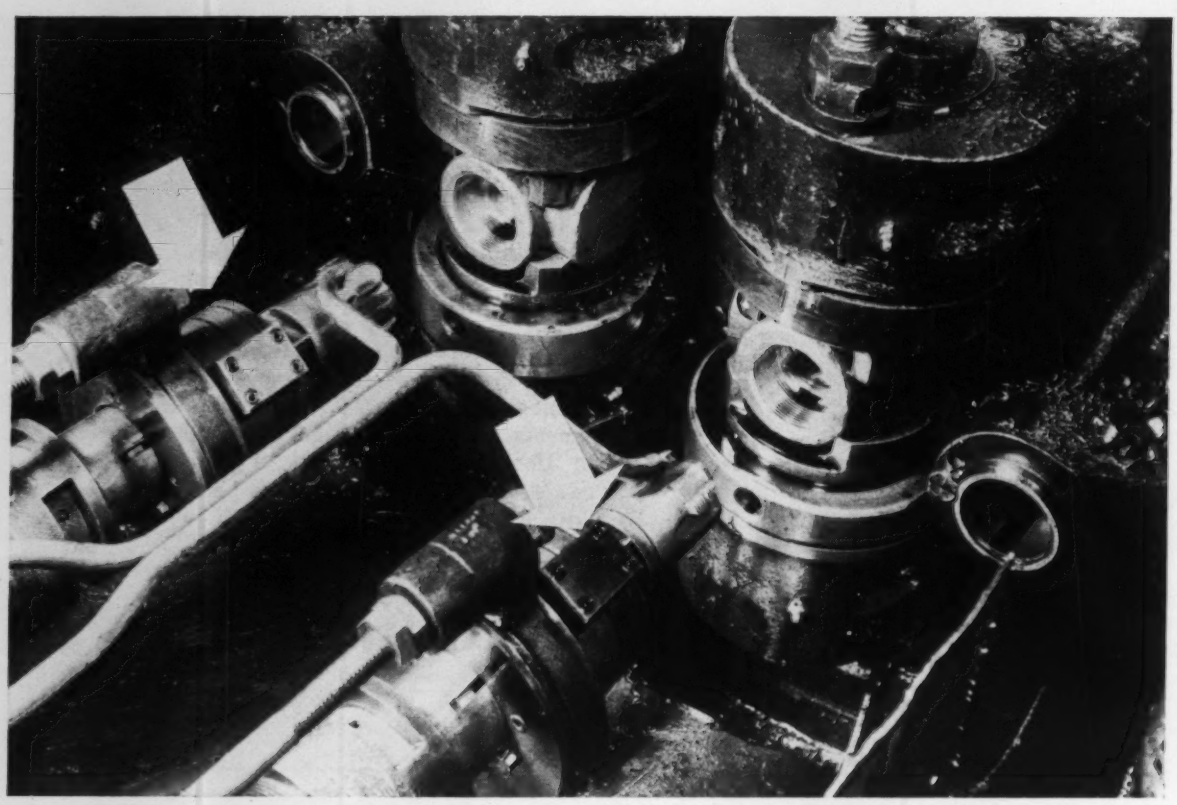
True modular construction saves you time, trouble, money. Three basic modules—case, display and drive—make up the *ElectroniK 17*. The case fits standard 19-inch relay racks. You can remove the door easily and without tools when converting from strip chart to circular chart or circular scale operation. You can pull out the chassis to the service position without tools, and without interrupting operation, or remove it completely. You can change chart speeds to ½ or 2 times basic speed (Standard chart speeds: 1, 2, 6, 10, or 60 inches per hour) by replacing quick-change drive gears. You change range and actuation simply by changing cards. Zener diode constant current supply eliminates battery problems. Up to 8 plug-in contact control modules provide for a wide variety of control possibilities.



HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

Tapered threads

produced with *LOW* tool cost by receding *TAP*



"Receding action" enables the LANDIS LL Tap to thread 4000 W-S pipe fittings per grind at production rates to close tolerances.

This action produces a tapered thread of great accuracy because it mechanically withdraws the chasers from the work at a rate equal to the taper of the thread being produced. Cutting strains are reduced, a true conical thread produced, thread finish improved, and chaser life lengthened.

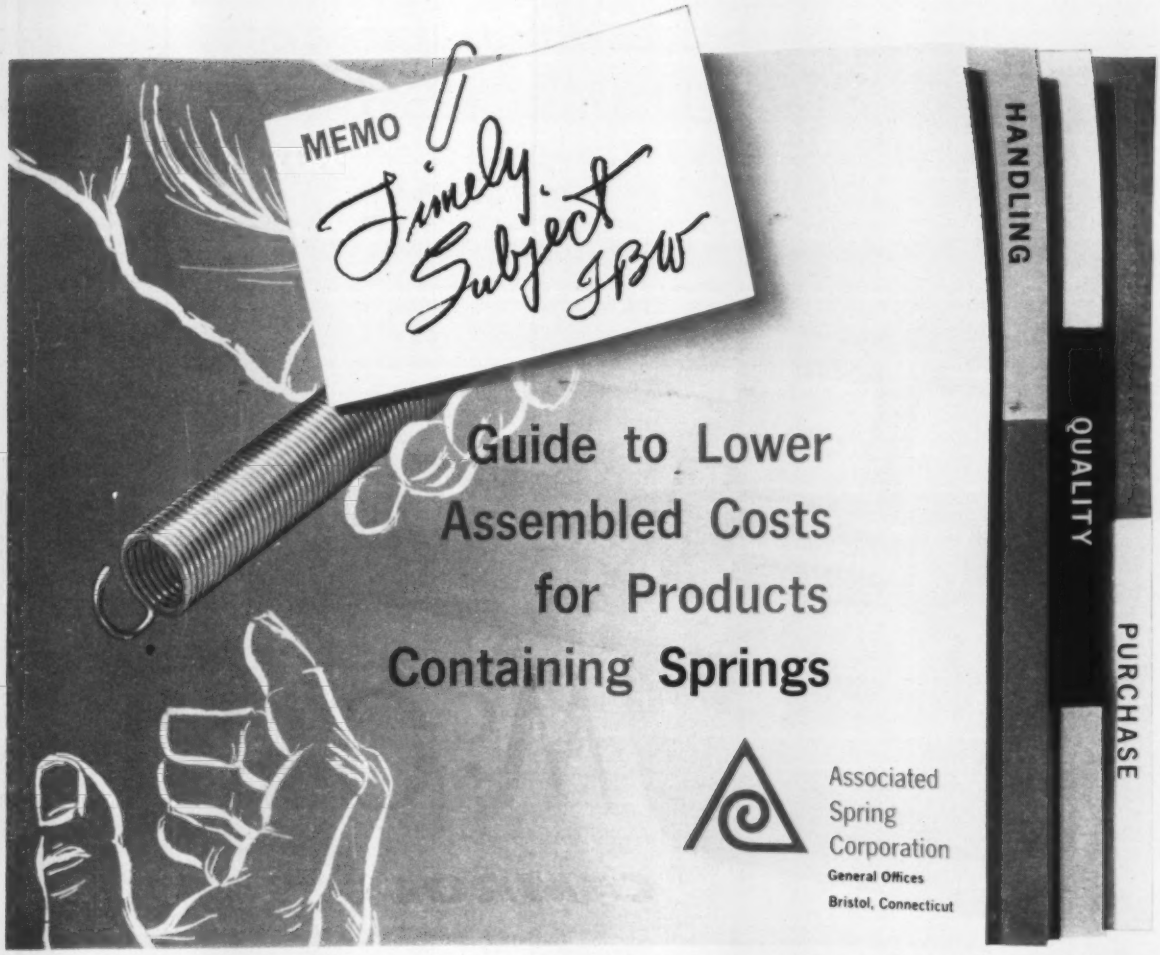
W-S pipe fittings are produced by the Watson-Stillman Fittings Division of the H. K. Porter Co., Inc. (Roselle, N.J.) for high pressure pipe lines. In the particular operation illustrated, two LANDIS LL Rotary Taps on a special drilling and tapping machine are threading Forged Steel Pipe Elbows. 2″ 11½ pitch ASTP threads are tapped at 35 s.f.m.—with 4000 threads completed between chaser grinds.

The LL Tap is also well-suited for threading Stainless Steel. Its cutting action is limited to the throat section or chamfer of the chaser, tapping the thread quickly with little cold-working. As on all LANDIS Taps, detachable heads allow each size of Tap Body to produce a wide range of thread diameters.

For further information, send specifications and ask for Bulletin G-95.

LANDIS *Machine* COMPANY | WAYNESBORO PENNSYLVANIA • U. S. A.

332-2



The Booklet Prepared with Your Profits in Mind

Success of a product in today's markets is often determined by progressive reduction of its assembled cost.

Springs, often overlooked in the over-all cost of many products or assemblies, represent significant opportunities for potential savings in the assembly function—especially in handling, quality, and procurement. This booklet details in each category how Associated Spring Corporation might help effect worthwhile cost reductions in the assembling of products using springs and related items. A free copy awaits you. Use the coupon at the right.

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Bristol, Connecticut

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A61-04

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ELIMINATE UNNECESSARY ASSEMBLY COSTS with

Replace improvised units with readily available precision cam followers.

McGILL®

CAMROL® BEARINGS

CF (Cam Follower) SERIES

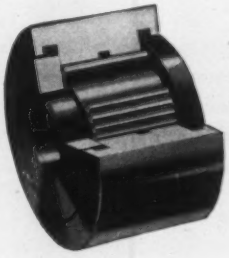
The original and still unsurpassed anti-friction roller bearing cam-follower bearing that adds efficiency at less cost to cam actuated, track and support roller applications. Built with full roller complement and integral stud, the CF series design provides high radial capacity and shock load protection in a compact roller with its own shaft. Easily applied and available in roller diameters of ½" to 4".

for the ultimate in:

- RADIAL CAPACITY
- SHOCK RESISTANCE
- SPACE ECONOMY

SCF SERIES.

Sealed to keep contamination out and lubricant in. It is dimensionally interchangeable with the CF bearings. A turned groove in the center of the outer raceway bore provides a permanent lubricant reservoir to approach life-time lubrication requirements. Can be easily re-lubricated.



SCYR SERIES (sealed)

CYR (Cam Yoke Roller) SERIES

The CYR series increases the adaptability of the CF bearing to all types of automatic machinery involving cam action or controlled-motion machine parts that require guide or support rollers. An inner ring replaces the stud for cam yoke roller mountings.

Write for Catalog No. 52-A for full information on McGill's needle roller bearings, and cam followers. Ask about recommendations for high precision special ball and roller bearings.

SCYR SERIES

This series provides a fully sealed Cam Yoke Roller type bearing. It is dimensionally interchangeable with the CYR bearings.

engineered electrical products

McGILL®

precision needle roller bearings

McGILL MANUFACTURING CO., INC., Bearing Division
301 N. Lafayette Street, Valparaiso, Indiana

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ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″. . . Roegal® (drawn galvanized) from .187″ to .005″.

You *pay* for the best when you buy galvanized wire. Make sure you *get* it—specify Roebling! For complete information, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, N. J.

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Roebling... Your Product is Better for it

Champion Upset Forgings Cut Valve Manufacturer's Finished Cost 30%!

At first glance this valve part looks like a typical screw machine product. But see that big wad of metal on the end of the stem? . . . It's the tip-off that you can save money with an upset forging.

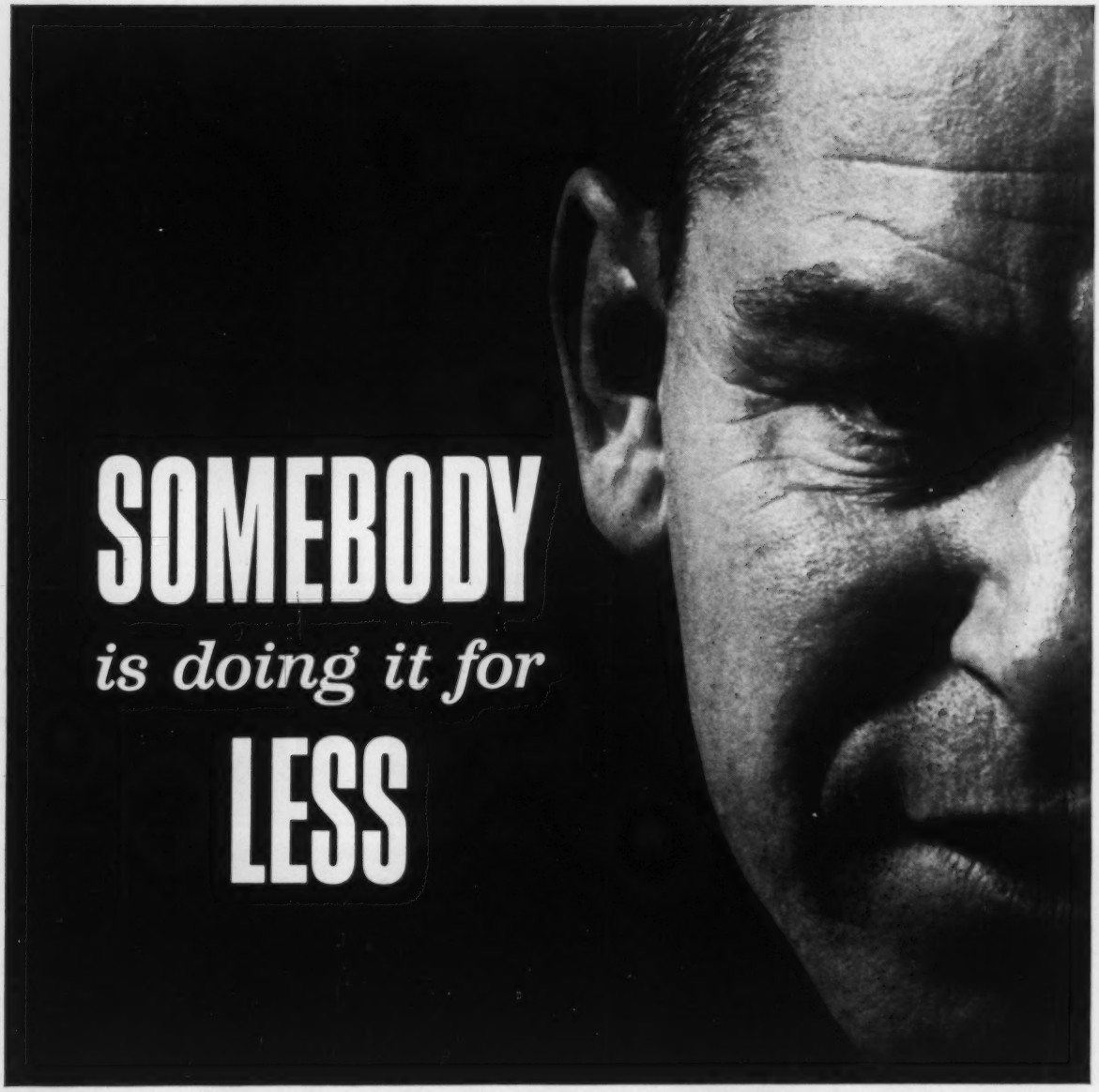
Any automatic screw machine part must start with stock of the largest part diameter and be worked down . . . with considerable waste.

In upset forging, you generally start with the smallest diameter and increase the part size to the largest diameter . . . with almost no waste. Forging also increases strength, by directioning grain flow in the metal.

If you're using similar parts, check with Champion and see how much you too can save by starting with an upset forging.

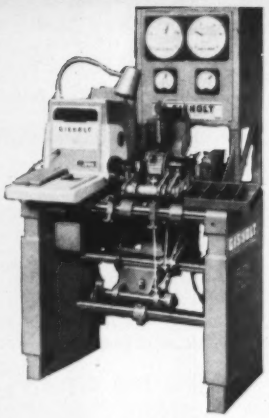
THE CHAMPION RIVET COMPANY
T. P. Champion, President
CLEVELAND 5, OHIO • EAST CHICAGO, INDIANA

When it's a vital part, better make it FORGED



Gisholt MASTERLINE® 1S Balancer Shown with separate unbalance location (angle) and amount meters for each correction plane. Readings hold until corrections are made. Measures vibrations down to .000025″—offers complete plane separation—needs no special foundation—correction planes can be inside or outside of work supports. Standard models available for work ½ oz. to 300,000 lbs.

New HS line handles miniature, high-speed parts—impellers, armatures, gyros, self-driven assemblies—measures vibrations down to .000002″.



If you have not analyzed your balancing methods in terms of cost reduction as others have, you're losing profits.

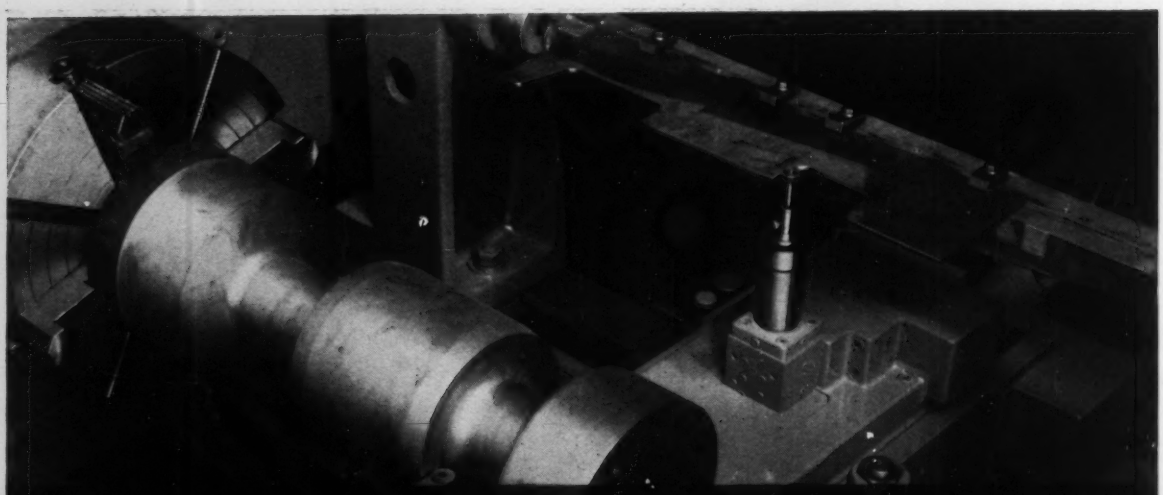
If you rely on operator skill or judgment, accuracy suffers, time is lost, reject rates or field failures are high. With Gisholt balancers, guesswork is eliminated, exact angles are indicated, and unbalance is quickly shown in terms of the correction method used. One man quickly locates, measures, corrects and inspects for balance in one handling—saving operations.

Few of the many balancers available today can pass even minimum performance tests for speed and accuracy. Only Gisholt meets them all—offering the advantages you need to do it for less.

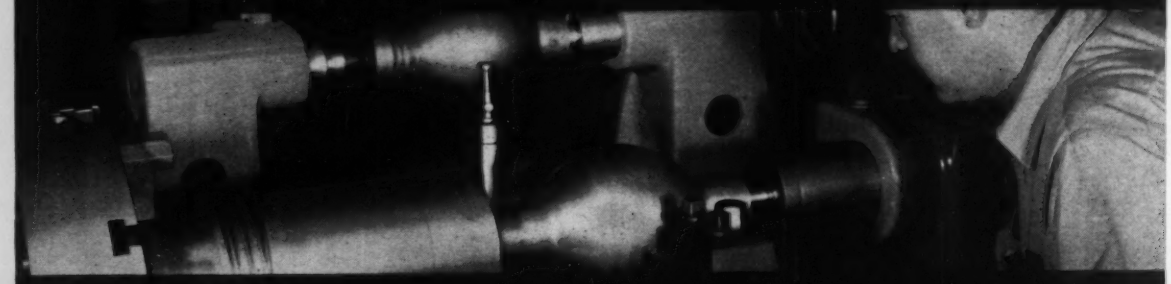
Contact your Gisholt Representative, or write for Catalog 1109D.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers® • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee



trace from flat or round templates



with LeBlond's new 90° Tracer

available on all LeBlond Heavy Duty Lathes from 1610 NE through 4025 NK.

EXCLUSIVE ADVANTAGES: No loss of swing capacity (raises unnecessary). Tracer system allows full horsepower at tool.

All hydraulic controls conveniently located at apron — change from trace to conventional simply by adjusting two nuts at apron.

No overarms or other obstructions to loading templates — all components, including hydraulic pump and tank, integral with cross slide.

Positive mechanical linkage between stylus and tool slide — no strain on cross feed screw and nut.

Tolerance — .001″ on diameter; .001″ on shoulder length.

Write today for descriptive bulletin.

...cut with confidence

THE R. K. LeBLOND MACHINE TOOL COMPANY,
CINCINNATI 8, OHIO

LeBLOND of Cincinnati

World's Largest Builder of A Complete Line of Lathes.

Time for Capital Spending!

One of the most disturbing aspects of the current economic situation is the holdup on capital spending in many quarters.

Money that needs to be spent for plant and equipment—and eventually will be—simply isn't being released now.

Projects in the steel, nonferrous, auto, and general metalworking industries that have passed the engineering stage and are ready for placing have been postponed two, three, and four times.

Many other projects, including equipment replacement, have been conceived and are waiting to be born.

Reasons for the delays are many and varied, but they boil down to current caution.

We do not think that caution right now makes good business sense for several reasons.

The only way the economy can move is up—in fact, we're in the process of moving out of the recession now.

Technological, economic, and political changes are taking place so fast around the world that only those companies which keep up can hope to prosper, or even survive.

The $13 billion a year being spent on research and development is resulting in myriad new products and processes that render old ones obsolete.

Markets are no longer localized; they have become international. So competition from both foreign and domestic companies must be met here and abroad.

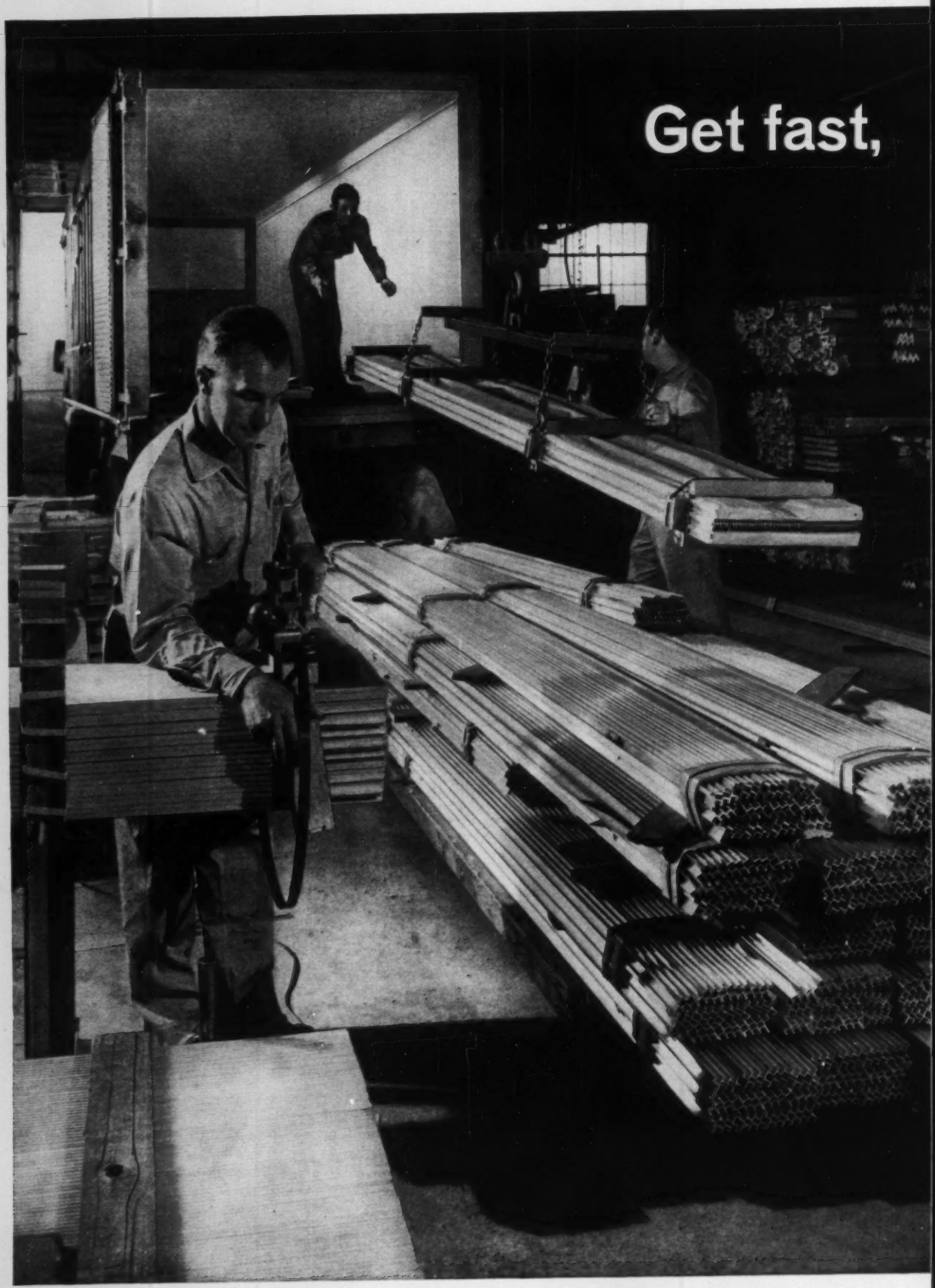
A good many companies are getting set. We have in mind a steel company with a new mill twice as fast as those of its competitors; a copper and brass producer with equipment so efficient it can sell its products at a nickel a pound under the going price; an auto company reworking a transfer machining line to get out more production in less floor space; and a tractor maker with an automated, single machine for turning out heavy parts at lower cost.

Those examples dramatize the need to replace obsolete productive capacity, although it's adequate, with new facilities.

This is no time for undue caution.

Irwin H. Such

VICE PRESIDENT-EDITORIAL


Get fast,

reliable delivery of the aluminum extrusions you need!

from your nearby independent fabricator...

Supplied with quality ALCAN aluminum by Aluminium Limited

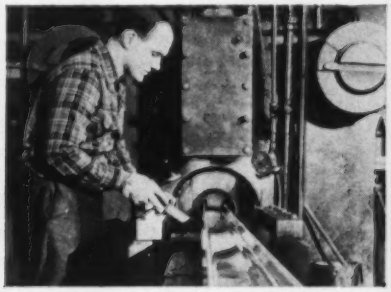
More and more, manufacturers are finding that their best source of extruded products is their nearby independent fabricator.

One reason—and an important one—is location. Because his plant is near yours, he can work closely with you in planning, pricing and engineering. He can give you convenient production scheduling . . . and assurance of on-time delivery to your plant.

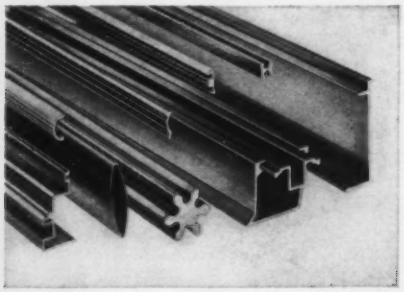
Another reason is his size . . . your business is important to him. He'll go all out to bring his many years' experience to the solution of your problems . . . to give you the quality, personalized service and unit cost that assure your repeat orders. Supplied by Aluminium Limited, your independent fabricator is backed by the research facilities of one of the world's leading aluminum producers.

Ask your aluminum extruder to estimate on your next order for semi-fabricated parts. You'll find him eager to give you the finest aluminum products at reasonable cost. Or, if you prefer, ask us to send you a list of independent aluminum extruders near your plant.

Design help. Your independent extruder is an aluminum specialist. Years of experience qualify him to help you develop the semi-fabricated aluminum shape best suited to economical fabrication.



Modern equipment. Investigate the facilities offered by your aluminum fabricator—you'll find him well equipped to serve you. His facilities, experience, location, and his personalized service make him your best source of semi-fabricated aluminum products.



Any shape . . . the right alloy. Your nearby extruder can turn out aluminum in a wide range of shapes to meet your most exacting requirements. He also works with you in choosing from a variety of aluminum alloys formulated by Aluminium Limited.

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Gentlemen: Kindly send me a list of independent aluminum extruders in my area.

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In service 40 years... never overhauled!

After *40 years of continuous service* at Alcoa's New Kensington, Pennsylvania plant, this rugged Cleveland Worm Gear Speed Reducer was slated for an overhaul.

As this unit—which continuously drives a foil mill—had never been opened before, a thorough, painstaking inspection was made by Cleveland service engineers. They found the reducer required *only* a new worm radial bearing to put it in top notch operating shape. Even the gear's working face was in almost factory-new condition—after 40 years of rugged, heavy-duty operation!

As our engineers left the plant, Alcoa personnel remarked, "Well, we'll see you again in another 40 years."

We are extremely proud of this experience at New Kensington. It serves to point up our belief that building product quality and performance in Cleveland Reducers is still the main reason we are in this business. We know from experience that industry welcomes quality products—and we will *continue* to produce them.

* Today, some capital goods producers seem to be guided by the philosophy that in this age of rapid change in manufacturing methods and equipment, the resulting high rate of obsolescence does not justify the costs entailed in building long operating life into a product. This is not true of Cleveland —and never will be.

Why not talk to your Cleveland Representative and get the latest information on Increased HP Worm Gear Speed Reducers. Or write for your free copy of our latest illustrated literature—it contains the story of today's finest reducers.

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3270 East 80th Street • Cleveland 4, Ohio

EATON

CLEVELAND
Worm Gear
Speed Reducers

AIR POLLUTION... A $7.5 Billion Problem, Multimillion Dollar Market

BLACK SMOKE SPEWING out of an industrial smokestack was accepted as a sign of prosperity 10 to 20 years ago—it represented jobs. People often dismissed a billowing smoke plume with: "Boy! Ajax is really pouring it out."

Today, different fuels, improved furnaces, better combustion, and smoke control programs have helped to clear the air. Smoke abatement is now only a minor part of a much larger problem—air pollution. It's a $7.5 billion headache which has created a multimillion dollar market for control equipment.

"There is probably no single phenomenon which affects man in more different ways than air pollution," says Vernon G. MacKenzie, chief, Division of Air Pollution, U. S. Public Health Service, Department of Health, Education & Welfare (H. E. W.). "For example," he notes, "it has been estimated that it costs the nation $7.5 billion a year in economic losses." He cites these areas:

- Damage to growing crops and livestock.
- Reduced visibility for air and surface transportation.
- Corrosion of metals and other materials.
- Soiling of everything from paint on houses to clothing.
- Mounting evidence that air pollution constitutes a serious hazard to our health.

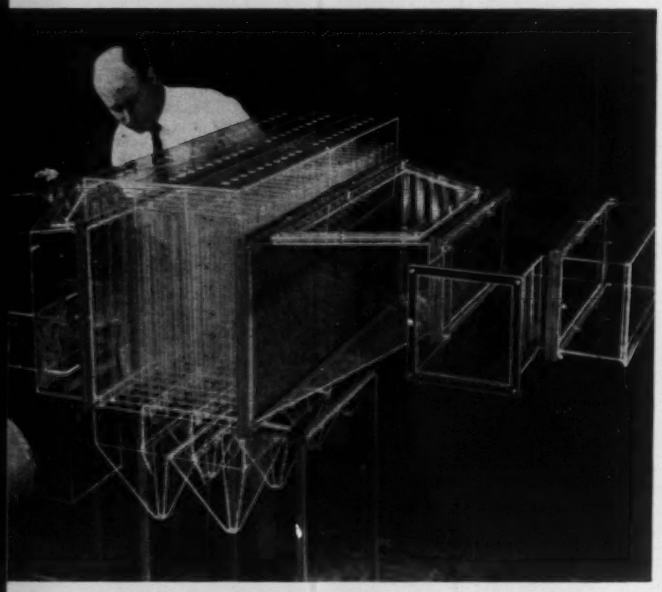
About the last item, Mr. MacKenzie says: "An impressive body of circumstantial evidence is accumulating which links air pollution with increased mortality from cardio-respiratory causes, increased susceptibility to respiratory diseases, and interference with normal breathing functions."

• **The Sources** — Air pollution comes from almost all our important industrial, domestic, and municipal activities—combustion, processing of materials, transportation, among others, giving rise to gases, fumes, and dusts.

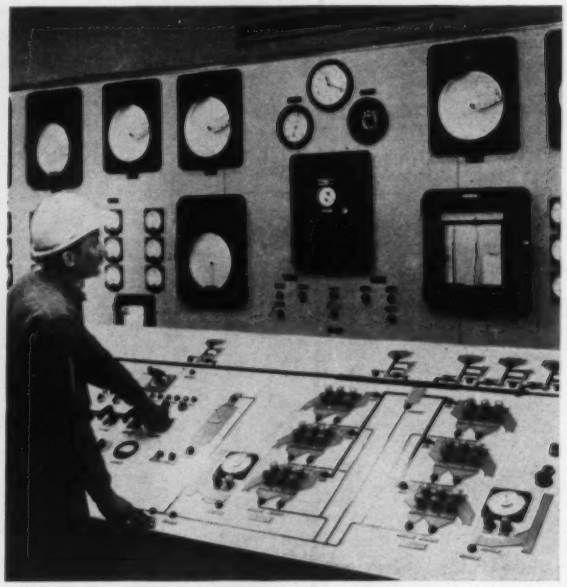
The clamor for clean air is charged with emotion. Sometimes, companies that wish to combat pollution are stymied. Here's a case in point.

In Cleveland, Jones & Laughlin Steel Corp. had converted three

Here's How a Large Steel Mill Controls Open Hearth Emissions



Electrostatic precipitators were selected. Western Precipitation Div., Los Angeles, Joy Mfg. Co., prepared layout and feasibility studies, then built a gas flow study model to determine the most efficient design before construction began. Result: Savings of thousands of dollars



In the control center, an operator regulates 12 precipitators that will handle 1.1 million cfm of hot gases from which tons of dust and fumes can be removed daily. The $6.5 million installation curbs emissions from 11 oxygen lanced open hearths. The system uses a single main flue

open hearths to the oxygen lance process and was installing electrostatic precipitators—all with approval of the city administration. Republic Steel Corp. was planning similar conversions and requested a one year period of grace before installing control equipment—the time needed to amass engineering, design, and control data.

But the City Council's Committee on Air Pollution said no, and ruled that controls had to be installed before conversion. The mayor remarked that the ruling was like requiring a carbuilder to design a muffler before the car was built and performance characteristics charted.

During the ensuing months, the committee held hearings, called witnesses, heard from citizen's groups, listened to hours of testimony, argued with the city's administration, wrangled among themselves, and finally gave Republic permission to convert to the oxygen lance process. The company was given 11 months to install pollution controls on the facilities.

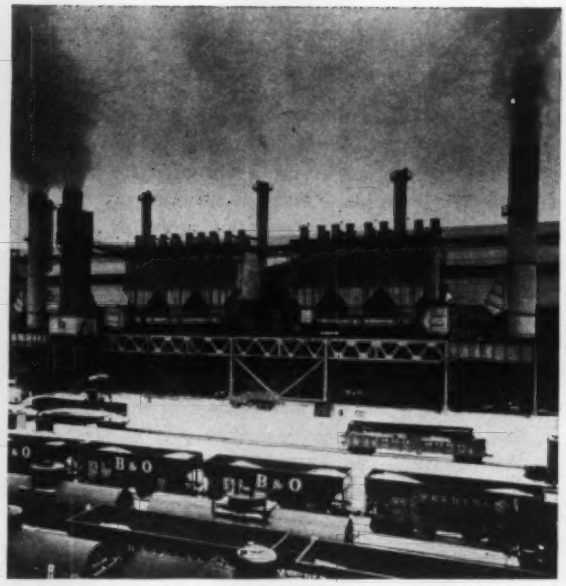
The precipitators will cost $800,000 to $1 million each. Equipment manufacturers usually spend one-and-one-half years in testing an open hearth's operating characteristics—with only 11 months to install the equipment, the cost of the project has mounted.

• **Central Problem**—A great part of the pollution control problem stems from disagreements over emission standards. What's acceptable in one community may not apply in another. Reasons: Climate, topography, industrialization, zoning, economics, and politics differ from city to city. While the Cleveland episode was unfolding, the City Council in Youngstown gave steel producers a ten year grace period, outside the city's smoke control ordinance, in which to test the oxygen lance process.

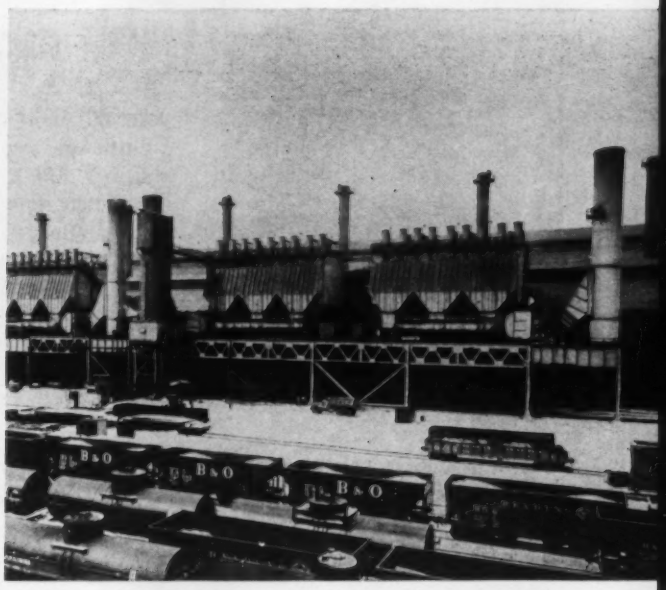
Max D. Howell, executive vice president, American Iron & Steel Institute, says: "Precipitation of open hearth dust is still more of an art than a science. . . . There is much research and development in progress. We hope we will be permitted to work out solutions to our problems without being hampered by restrictive legislation, which can have little grounding in reality until the state of the abatement art is more advanced."

• **Reasons for Growth**—The Industrial Gas Cleaning Institute Inc., New York, composed of companies that make electrostatic precipitators, mechanical collectors, fabric filters, and wet scrubbers, sees a number of reasons for its industry's growth: "New applications are continually being made as a result of industry's desire to clean its plants." Some of the factors: Community pressure, company good will, refined production processes requiring a greater degree of atmospheric cleanliness, or the realization that valuable materials are presently being lost to the atmosphere.

What is industry doing to keep the air clean? Lee Schreibeis, acting director, Allegheny County Bureau of Smoke Control, Pittsburgh, says: "The metalworking industry leads the country in air pollution control, and steel is certainly in the



During the first tryout of the system, all furnaces were operated at full tilt to check the degree of emission without precipitator control. The smaller stacks in the background, part of the open hearth network, were capped permanently so all smoke and dust would be fed through the system



With precipitators in action, virtually all contaminants are removed—better than 97.5 per cent—and only cleaned air is released to the atmosphere. The precipitators are in banks of three between the main stacks. Control will still be effective if one of the precipitators is shut down

fore—particularly in Pittsburgh." The county has only 11 per cent of the country's open hearths, but it has 42 per cent of those that are equipped with electrostatic precipitators. The price of prevention is high. About 10 per cent of the capital investment of the foundry industry goes for equipment and processes that help keep waste materials out of the air. The chemical industry spends $40 million a year just to operate its air pollution controls. The auto industry is spending about $1 million a year for research in an effort to find a way to eliminate fumes from cars. By yearend, the oil refining industry will have spent $105 million in six years on control measures.

• **The Market** — Determining the amounts spent on research and control of air pollution is as difficult as grabbing and holding a fist full of smoke. "Just how big the overall story is, we don't know, but we do know that half a billion dollars yearly is going into air pollution control on the North American continent," says Arnold Arch, executive secretary, Air Pollution Control Association, Pittsburgh. One industry official has heard estimates that the control industry has an annual growth potential of $30 million to $150 million. The 1958 Census of Manufactures shows $70 million as the value of shipments by makers of dust collection and air purification equipment and air washers. Officials estimate that sales of basic equipment today, plus the detection and other instruments used, research, services, auxiliary gear, and administrative costs push total air pollution expenditures almost to the half billion dollar mark.

• **Community Problems**—Calculations of air pollution engineers indicate: If all the dirt that accumulates in the air of an average city in a year settled to the ground at one time, the area would be covered by a 21 ft avalanche of soot and debris.

About 90 per cent of our urban population lives in localities with air pollution problems. Some 6000 communities have contaminated atmospheres in varying degrees. One community in six has a pollution problem which arises outside its own boundaries. Air pollution is present in 212 metropolitan areas; each includes a number of separate political jurisdictions; and 23 of the pollution problems cross state lines.

Inadequate staffing is haunting some cities. Only 106 local control programs are staffed full time. They serve 342 political entities (cities, counties, townships) which comprise about 45 per cent of the national urban population. Only 15 states have full time programs, and they employ a total of 110 personnel.

• **Federal Control Looms**—Ivan A. Nestingen, Health, Education & Welfare undersecretary, believes increased federal work should be in terms of taking a more "active role" in research and technical assistance "leadership" which would "stimulate greater air pollution control effort on the part of industries, states, and local governments." Unless those groups get the job done, Washington will be forced to assume more control activities. "Spe-

What Control Plan Is Best?

Arnold Arch, executive secretary, Air Pollution Control Association, Pittsburgh, says: "People often approach me with the question: 'Why doesn't APCA prescribe and follow one co-ordinated plan for air pollution control?' My answer is simple: There is no one way on our continent. Each community has its own pollution problems . . . We haven't an over-all control plan, but we subscribe to 1001 different plans—each tailored to local needs . . ."

cific legislation to that end is in preparation," he says.

In his message about natural resources, President Kennedy said: ". . . we need an effective federal air pollution control program now . . ." His administration endorses the report, "National Goals in Air Pollution Research," which was compiled for the U. S. surgeon general in 1960. It states that research expenditures by all groups in the U. S. are at a current level of $11 million a year and urges an increase to $32 million annually by 1968. About 40 per cent of the work would be done by Uncle Sam, 28 per cent by states, and 32 per cent states and local governments.

• **Congressional Pressures**—Liberals in Congress want to broaden federal activities in air pollution control. Sen. Thomas H. Kuchel (D., Calif.), is the author of the Federal Air Pollution Research Act, passed in 1955. He wants the Senate's Public Works Committee to consider a new measure which calls for "more extensive and vigorous federal participation in efforts to overcome atmospheric contamination." The same bill passed the Senate last year but was pigeonholed by the House. A new bill (S. 455), provides for hearing boards to look into air pollution problems "which are general in character or concern more than one state." The boards would be appointed by H. E. W. upon recommendation of the surgeon general or at the request of state or local government agencies.

Sen. Maurine Neuberger (D., Oreg.), would go farther. After a series of intermediate steps, the H. E. W. secretary could issue an air pollution abatement order which would be final except for review by the U. S. Court of Appeals. The proposal would also authorize a fund of $25 million for grants to states, municipalities, and interstate agencies.

• **What's Next?**—H. E. W. hopes to continue in its advisory capacity. In the case of the Cleveland steel companies, it offered advice, kept clear of local politics, and warned the public that the quarrel over the steelmaking process was a tempest in a teapot compared with Cleveland's whole problem. It made no sense to make one company a scapegoat when the city was paying so little attention to pollution by automobiles, home furnaces, incinerators, and the like.

Mr. MacKenzie says: "Almost none of our metropolitan areas, with the possible exception of Los Angeles, has developed enough knowledge about all the factors to be able to relate quantitatively the quality of the community air to specific emission sources." He does not want standards established prematurely.

But we must get going on the problem promptly. By 1970, our industrial output will nearly double. Our population will hit 214 million, an increase of 20 per cent. More than one-half of the U. S. populace is concentrated in 192 metropolitan areas—less than 10 per cent of the country's land area. In the next ten years, approximately two-thirds of the population will reside in urbanized areas. As we tend to increase our per capita use of materials and energy, the pollution potential will grow immensely.

• **What's Needed?**—W. L. Faith, managing director, Air Pollution Foundation, San Marino, Calif., proposes: 1. More information relating the sources of air pollution to effects on people and property. 2. Development of effective control methods that will not be so expensive as to disrupt the economy of the community. 3. Broad dissemination of the facts of air pollution in language readily understood by the public. 4. A co-operative approach between business and government toward legislation adequate to protect the public, yet in keeping with the principle of fair play.

He adds: ". . . All too often, we find government, industry, and the public separated by a wall of mutual suspicion and distrust, which makes it difficult to apply sound reasoning to the control or abatement problem. But just as the ignorance factor can be diminished by sound research and an enlightened public information program, this suspicion and distrust can be dissipated by a little compromise and better liaison."

Equipment makers face more than the challenge of good citizenship: Needed are more research and development on more efficient, lower cost equipment.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

STEEL's Panel of Economic Consultants Declares . . .

Recession Is Over; Upturn Is Here

OPTIMISM has replaced pessimism in the business world, and rightly so, claims STEEL's Panel of Economic Consultants.

The collective opinion of this group of 51 of the nation's top economists and market researchers (see list, Page 42) is: The shortest and mildest of the postwar recessions has run its course. The second quarter will be marked by much talk of "bottoming out," but there will be a slow rise in the general economy, leading to a genuine recovery during the balance of 1961.

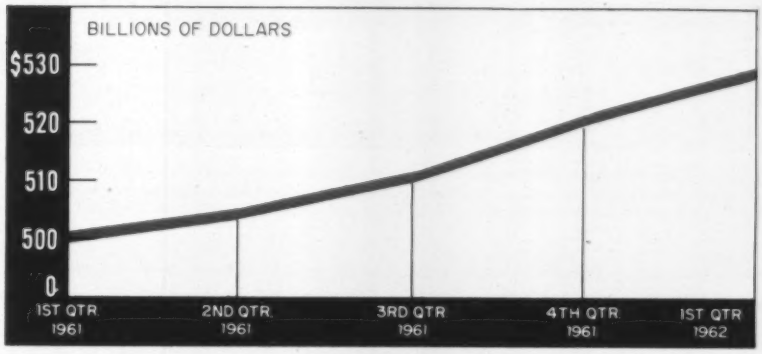
• **Production to Lag**—Three out of four of the consultants peg this quarter as the turning point for gross national product (GNP), the overall measure of the nation's economic well being (see graph above). With one exception, the others think the improvement will come in the July-September quarter. The lone dissenter (appropriately from the Southwest) believes GNP will hold at a $500 billion annual rate throughout the year. The median estimate of the panel (for the year) is $508 billion, exceeding the record of $503.2 billion set last year.

But the panelists see production in a lagging pace (see second graph). Only 56 per cent feel the turnabout will come this quarter, while all but one (the maverick again) of the rest pick the third quarter. However, it should be noted that this is a shift to the second quarter—in the October survey, almost all the experts spotted the third quarter as the recovery period.

• **Especially Durables**—The most disconcerting feature of the third semiannual survey of the panel is that, with few exceptions, the economists foresee only a slight improvement in durable goods manufacturing between now and the fourth

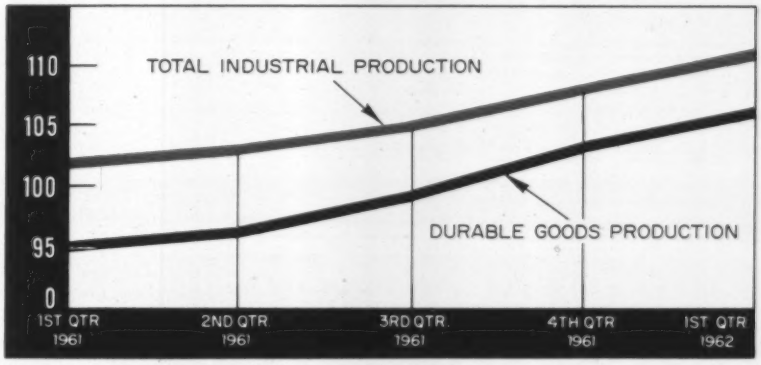
Gross National Product to Hit New Highs

(Annual rate, seasonally adjusted)



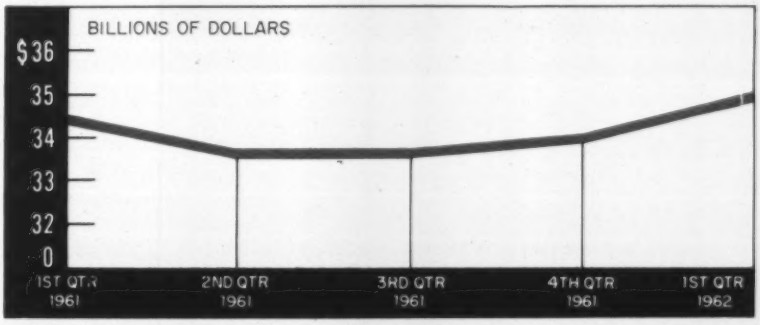
Production to Climb Slowly but Steadily

(Federal Reserve Board, 1957 = 100, seasonally adjusted)



Capital Spending Dip to Be Mild

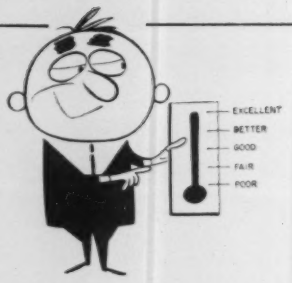
(Plant and equipment expenditures, annual rate, seasonally adjusted)



Median estimates of STEEL's Panel of Economic Consultants. First quarter, 1961, estimated by STEEL, except for plant and equipment expenditures which are estimated by the Securities & Exchange Commission.

quarter. Compared with the first quarter average of about 95 (1957 = 100), the Federal Reserve Board's index of durables production will be only 99 in the third quarter. It averaged over 104 for all of 1960. Evidently the economists have softened their estimates for that section of the economy. In the October survey, they predicted the average for 1961 would be 100.

Part of the change can be traced to expectations for the steel and automotive industries. The forecasters look for only 95 million tons of steel to come rolling out of the mills this year compared with their earlier prediction of 100 million. However, at that time they were anticipating about 5.9 million new passenger cars for this year. Now they feel motordom will produce only about 5.5 million units in calendar 1961. (Several noted that much would depend on labor negotiations in late summer.)



STEEL's Panel of 51 Economic Consultants

A. G. Abramson, director of economic planning, SKF Industries Inc.
John T. Anderson, manager, Commercial Research Dept., Armco Steel Corp.
Miner H. Baker, vice president & economist, Seattle-First National Bank.
John J. Balles, vice president & economist, Mellon National Bank & Trust Co., Pittsburgh.
Edward S. Bigelow, economist, Minneapolis-Honeywell Regulator Co.
Ingersoll D. Bruner, economics research analyst, Carrier Corp.
William F. Butler, vice president, Chase Manhattan Bank, New York.
William P. Carlin, director of economics, Republic Steel Corp.
Fred Carlson, director of business research, Dresser Industries Inc.
George W. Coleman, economist, Mercantile Trust Co., St. Louis.
Robert Coltman, vice president, Philadelphia National Bank.
Edward L. Cushman, vice president, American Motors Corp.
James M. Dawson, vice president & economist, National City Bank of Cleveland.
Robert J. Eggert, market research manager, Ford Motor Co.
David C. Elliot, vice president, Cleveland Trust Co.
Ira T. Ellis, economist, E. I. du Pont de Nemours & Co. Inc.
Richard W. Everett, assistant manager, sales control, Continental Can Co. Inc.
W. H. Finigan, director, marketing research, National Cash Register Co.
A. C. Fischer, regional market planning manager, Westinghouse Electric Corp.
William C. Flaherty, director, business research & market planning, Chrysler Corp.
Curry W. Gillmore, director of statistics & economics, International Business Machines Corp.
Borden Helmer, economist, Union Carbide Corp.
Joseph K. Heyman, senior vice president, Trust Co. of Georgia, Atlanta.
William Dudley James, product manager, Ophthalmic Div., Bausch & Lomb Inc.
C. C. Jamison, vice president & manager, Research Dept., Security First National Bank, Los Angeles.
Norris O. Johnson, vice president, First National City Bank of New York.
Lester S. Kellogg, director of economic research, Deere & Co.
Edmund R. King, assistant treasurer & chief statistician, Eastman Kodak Co.
B. J. Korb, manager, market & economic research, Koppers Co. Inc.
Herbert A. Leggett, vice president & economist, Valley National Bank, Phoenix, Ariz.
Harry Leopold Jr., director of commercial research, John A. Roebling's Sons Div., Colorado Fuel & Iron Corp.
Irving Lipkowitz, director of economic affairs, Reynolds Metals Co.
C. W. Mackay, manager, Business Research Dept., Anaconda Co.
Stanley V. Malcuit, staff economist, Aluminum Co. of America.
Noel McBride, supervisor of sales analysis, Clevite Corp.
H. C. Micoleau, economist, financial staff, General Motors Corp.
Robert A. Pitcairn, manager of market research, Crucible Steel Co. of America.
James L. Rich, assistant director of commercial research, U. S. Steel Corp.
W. R. Riggs, manager, Commercial Research Dept., Kaiser Steel Corp.
Norman Robertson, manager of economic studies, American Radiator & Standard Sanitary Corp.
Nathaniel H. Rogg, director, economics & policy planning, National Association of Home Builders.
Arthur Rosenbaum, manager-economic research, Sears, Roebuck & Co.
W. E. Rothfelder, manager, Commercial Research Div., Inland Steel Co.
Arthur A. Smith, vice president & economist, First National Bank, Dallas.
A. Howard Smith, manager, Commercial Research Dept., Jeffrey Mfg. Co.
Beryl W. Sprinkel, economist, Harris Trust & Savings Bank, Chicago.
Benjamin F. Stacey, vice president, First National Bank of Boston.
Robert W. Storer, vice president, Manufacturers National Bank of Detroit.
Murray L. Weidenbaum, economist, Boeing Airplane Co.
David L. Williams, economist, Cleveland Twist Drill Co.
Raymond E. Zelder, chief, business conditions & forecasting, Bank of America.

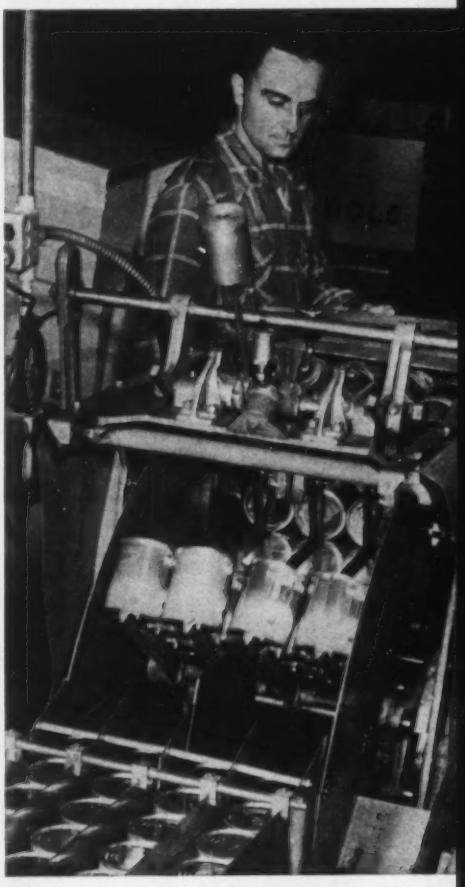
• **Capital Spending Firm** — But while they don't see the plants running at anywhere near top speed, they do see the need for continued high level spending for plant and equipment. Last October, the consultants said such expenditures would total about $33.5 billion this year. Now they think they will be closer to $34 billion, with a return to an upswing evident in the fourth quarter. By the first quarter of 1962, plant and equipment spending will again be exerting a potent expansion force on the economy (see graph, Page 41).

• **Switch in Construction** — The economists have made an about-face in their thinking on the construction industry. Last October, they looked for housing to lead the upturn with a 6.4 per cent improvement in 1961 over 1960, but they felt that construction as a whole would do well to advance a scant 0.4 per cent. Disappointing reports toward the end of the year followed by minor improvement so far in 1961 have caused them to drop their sights on total housing starts to 1.3 million units, or just 1.5 per cent over the total for last year. But, they now feel that new construction put in place will rise to a record of $56.5 billion this year compared with $55.2 billion in 1960 (up 2.4 per cent).

• **No Boom**—The forecasters are being somewhat cautious this year compared with the exhilarating confidence prevalent when the first survey of the panel was conducted a year ago. More than one member commented that his estimates were probably too low, but conditions at the moment were not clear enough to justify raising them. But not one of them indicated that the economy is sitting on a false bottom. Nor did anyone mention the word "boom" in the outlook through the first quarter of 1962. Orderly improvement best describes the tenor of the panel.

Closed Congo tin mines and trouble in Indonesia and Bolivia are behind the price rise, but . . .

U. S. Well Stocked with Tin



THE PRICE of tin was about $1.04 a pound (vs. about $1 in February) as STEEL went to press, and it may go a little higher. Some temporary shortages may develop in some markets of the world. But there will be little if any impact here at home.

What triggered the price rise? Last month, the International Tin Council revealed that the Congo tin mines had been down since late last year. Immediately, some of the large European users rushed into the Singapore market and began buying large lots of metal.

• **Ghost of Lumumba**—There are rich deposits of tin in the Kivu and Katanga provinces in the Congo. Kivu was the stronghold of the late Premier Patrice Lumumba which is now controlled by Red-oriented Antoine Gizenga. The hate that has been generated by the prolonged Congo disorder and the murder of Lumumba make the situation so cloudy that no one is willing to guess when "normal" shipments will be restored —its production averaged 13,000 tons annually in the five years prior to the imposition of controls in the 1957 International Tin Agreeement.

Trouble brewing in Indonesia and Bolivia touch off more speculation about metal shortages—they are the second and third largest producing nations. Heavy rains have been a factor in Indonesia, but observers say production problems go a lot deeper—they are tied to political factors.

Bolivia has multiple troubles with its nationalized tin mines, which account for the overwhelming bulk of the nation's income. During World War II, she supplied the U. S.'s total tin needs. Productivity has been limited, however, by some wasteful mining methods. Since nationalization, mine employment has doubled, but output is lower. It's becoming evident the golden goose can lay only so many eggs. Meanwhile, Bolivia is playing footsie with the Russians for a tin smelter.

• **Bright Spots**—Production is running smoothly in Thailand and Nigeria. Malaya, the world's largest producer, is bringing in new mines all the time.

There's a possibility that some temporary tin shortages could develop in some world markets. There has been a tremendous growth in tin usage in Japan and Germany and to a lesser extent in England and France. But the worst in the trouble spots would have to occur—and that's not likely on any prolonged basis.

• **U. S. Supplies**—Here at home, steel executives with tin plating facilities see no problems ahead. Here's why.

The government has an enormous tin stockpile—some estimate it can supply U. S. tin requirements for the next six or eight years. Officials report the government would be delighted to unload some of the supplies because of the tremendous investment tied up in the metal.

Steel companies with tin plate facilities are also well stocked with tin. Two major steelmakers contacted by STEEL said they could meet their tin plate requirements well into 1962 without purchasing a pound of additional tin.

Overproduction of tin led to the establishment of the International Tin Agreement. To help control prices and stocks, a buffer pool was set up. If a shortage does occur in world markets, the pool manager has the authority to begin selling tin when the price is about the equivalent of $1.05 a pound, delivered in the U. S.

• **Outlook** — What does all this mean? No problems for domestic tin users. Prices may go up a little, but the flurry will be shortlived. Because the price of tin is not a controlling factor, no price changes in tin plate will result.

Kennedy Seeks 'Lean & Fit' Defense

A HUGE BOOST in the Polaris production program and significant increases in contracting authority for research on nonnuclear weapons (for limited warfare) best sum up the President's proposed $43.8 billion defense budget.

Dollarwise, JFK's recommendations mean an increase in spending of $24.5 million in the three months remaining of fiscal 1961 and $650 million in fiscal 1962. Over the long range, the message is much more significant: New obligational authority (the authority to contract) is $1,954 million above the Eisenhower budget of fiscal 1962. Research authority, much of it in new weapons which will become procurement items in later years, is $376 million higher than it was.

The President described the changes as moving us toward a "lean and fit" defense posture . . . one that will enable us to deter war with the threat of atomic retaliation, survive a first atomic blow, survive several attacks via a well planned productive capacity, and fight limited or guerrilla wars on more than one front at the same time.

A diversity of forces will be needed to accomplish the goals; more money will be requested for fiscal 1962 before the year is over—certainly defense expenditures will continue to rise through the years of the Kennedy administration. Specifically, the President has mapped out several changes in programs important to metalworking including:

• **POLARIS**—A fleet of 29 is scheduled to be started through fiscal 1962; undoubtedly more will be requested for fiscal 1963. By June, 1963, we will be building Polaris submarines at a rate of one a month (STEEL, Feb. 6, p. 44). Since coming into office, JFK has added 15 Polarises to Ike's program. He has also ordered the A-3 long range version of the missile speeded up.

• **MINUTEMAN**—The railroad launched version has been put back to a "research" project; the three squadrons scheduled will be hard based. Production capacity for the missile will be doubled. We will have 600 Minuteman missiles by the end of 1964.

• **SATELLITES**—All work on military satellites will be speeded up: Midas by $60 million; others, including Advent, Discoverer, and Samos, and ballistic missile defense and penetration aids (decoys), and the Dynasoar boost glide system, by $226 million.

• **NIKE-ZEUS**—Between $250 million and $300 million is still scheduled, but none of this is the production money wanted so badly by the Army (STEEL, Feb. 27, p. 74).

• **NONNUCLEAR WEAPONS RESEARCH** — Increased firepower, mobility, and communications will be sought in land, sea, and air programs investigating new weapons for limited and guerrilla warfare. Antisubmarine warfare is included. The increased research will be worth $122 million in contracts.

• **NONNUCLEAR WEAPONS PROCUREMENT**—The latest weapons available to the service in fiscal 1962 will be contracted for in amounts $230 million above Ike's budget. Included are: Helicopters, rifles, electronics and communications equipment, improved ammunition for artillery and infantry, torpedoes, portable air defense weapons, new 1½ ton trucks, and multipurpose, floatable or crosscountry vehicles.

Shifts Proposed in 1962 Defense Budget

(Above or below Eisenhower program)

	(In millions)
INCREASES*	
Polaris Submarines, Missiles	$1,340
Minuteman ICBM	96
Skybolt (B-52 launched, 1000 mile missile)	50
Air & Ground Alert of SAC	45
Midas (missile warning satellite)	60
Air Defense	23
Command Posts, Communication Centers	16
Advanced Missile, Space Projects	226
Nonnuclear Weapon Research, Development	122
Airlift, Sealift	212
Ship Modernization	84
New Tactical Fighter Aircraft	45
Helicopters, Rifles, Communications Equipment, Improved Ammunition	230
DECREASES**	
Cutback in Titan Program	100
Accelerated B-47 Phaseout	35
Snark Killed	7
Cutback in B-70	138
Cutback in Atomic Plane	35
Eagle Missile Canceled	57
Cancel Installation of Polaris on Cruiser Long Beach	58

*Represents authority to place orders, not actual spending.
**Figures are savings in spending in the fiscal year.

CINCINNATI

CINCINNATI MILLING MACHINE DIVISION

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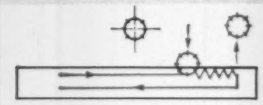
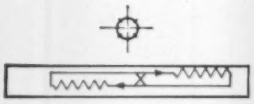
MILLING MACHINE

...for intermediate range automatic milling

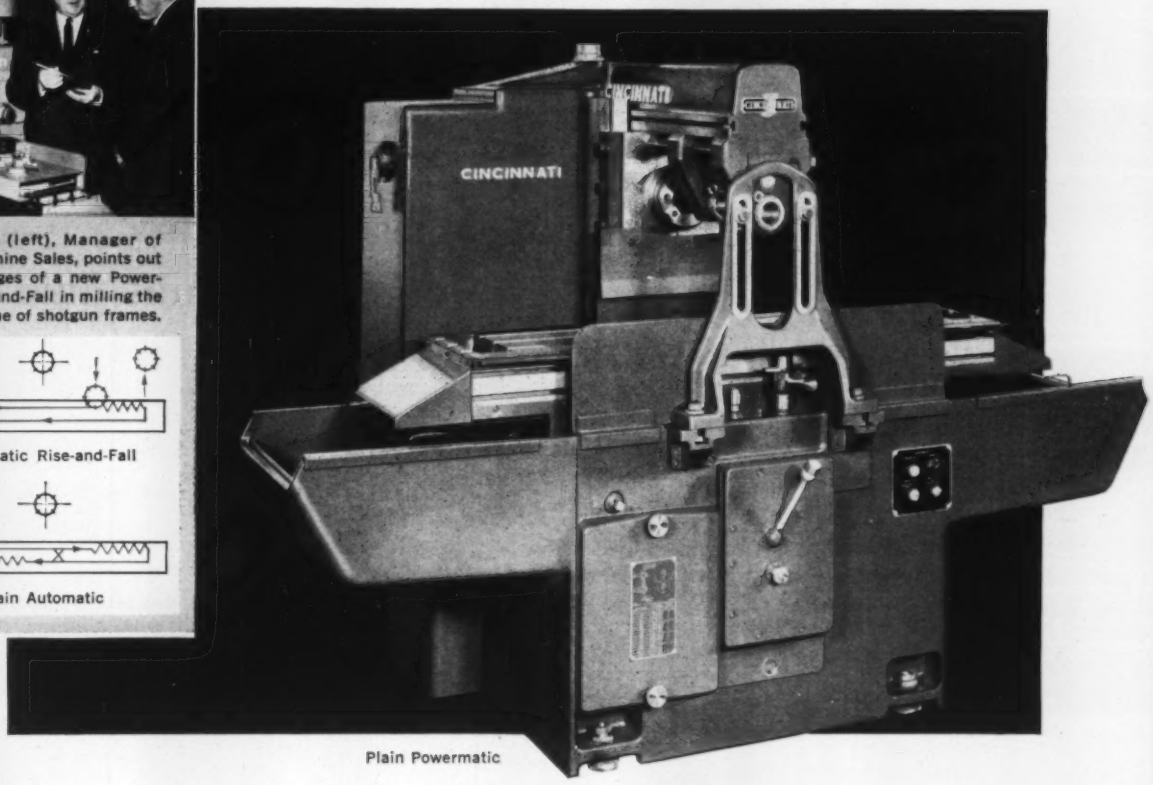
Jack Lynch (left), Manager of Milling Machine Sales, points out the advantages of a new Powermatic Rise-and-Fall in milling the bottom profile of shotgun frames.



Automatic Rise-and-Fall



Plain Automatic



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1. Cools off systems. Because of its high rate of heat transfer and high heat capacity, Irus 902 can allow hydraulic systems to run cooler.

2. Resists thickening and thinning. The viscosity of Irus 902 is tailored to protect pump parts during the entire working cycle—from cold start-up to hot, continuous operation.

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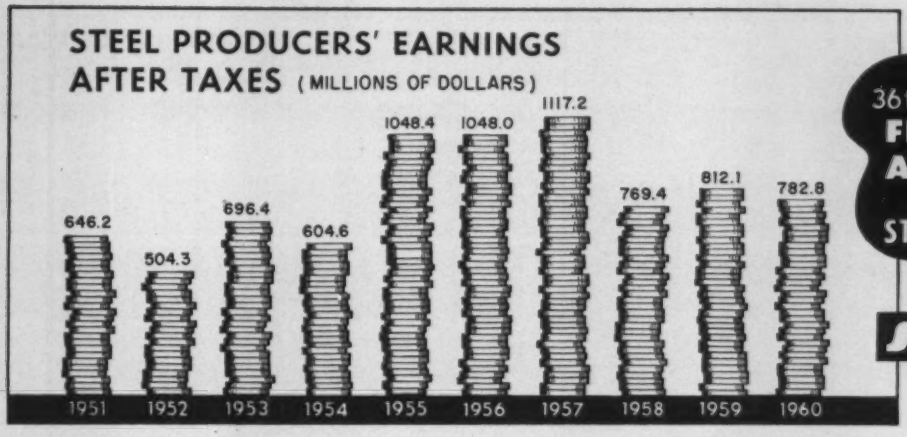


36th ANNUAL **FINANCIAL ANALYSIS** OF THE **STEEL INDUSTRY**

Supplement to **STEEL**

April 3, 1961

Steel Output Up; Profit Down in '60

THE U. S. steel industry made more steel and less money in 1960 than it did in 1959. Ingot output was up 6.24 per cent, but net profit was down 3.61 per cent.

The decline in profit stemmed from a drop of 1.02 per cent in sales dollars, an increase in costs (such as for labor and for interest on debt), and from the inability (in some cases) to bring down operating expenses as fast as demand and production fell through the year. (Starting from a record in the first quarter, output fell in each succeeding quarter.)

The contraction in the intake of sales dollars reflects two things: Some companies shifted to lower profit items in their product mixes; and some companies took competitive measures (such as waiving of certain price extras and absorption of freight charges) to get business.

On the performance of 34 companies representing 94.58 per cent of the nation's ingot capacity, the entire industry had net sales and revenues of approximately $14,449,000,000 in 1960 and net profit of $827,612,000. In 1959, the industry's sales were $14,598,000,000, and net profit was $858,637,000.

So out of each dollar of sales, 5.73 cents was net profit in 1960 and 5.88 cents in 1959.

Three of the 34 companies reported net losses in 1960 compared with two in 1959. Of the 31 companies which had net profits in 1960, 22 had declines; nine had increases.

Labor took a bigger bite of the sales dollar. Thirty-nine and one-half cents of every sales dollar went for employment costs compared with 36.6 cents in 1959 and only 30.9 in 1950. Increased costs of labor and a 2.23 per cent rise in the average number of people employed pushed employment expenditures 6.43 per cent above those of 1959.

Another cost increase (4.95 per cent) was in interest and expense on expanded long term debt. In 1960, long term debt rose 6.27 per cent because of increased borrowing for plant improvements. The iron and steel industry's outlay for new equipment and construction was an estimated $1,480,000,000—second highest on record.

More capital is invested now in the steel industry than ever before. The industry's investment (total capitalization) approximated $13,350,000,000 in 1960, a 3.14 per cent increase over 1959's $12,943,000,000 and a 110.5 per cent leap above 1950's $6,342,000,000.

The high level of spending for new plant and equipment brought about a 4.38 per cent increase in provisions for depreciation. The percentage increase would have been larger had there not been a decline in fast amortization of facilities built under defense legislation during the Korean War. Amortization of those properties is about completed.

The drop in dollar volume of sales and net profit cut the federal government's take in income taxes 5.19 per cent. In 1960, the government got approximately $792,000,000; in 1959, $835,400,000.

Decreased income and increased expenses lowered the industry's working capital 3.23 per cent. However, current liabilities declined to a greater extent than current assets. Result: For every dollar of current liabilities, the industry had $2.57 in current assets compared with $2.45 in 1959.

With the increase in investment in the steel industry has come a growth in the number of holders of common stock. (For the first time, the total has exceeded 1 million.)

An increase in the number of shares of common stock and a decline in net earnings lowered the net income per common share (after allowances for preferred stock dividend requirements) to $3.35 in 1960. In 1959, it was $3.55.

• *An extra copy of this Financial Analysis is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

THIS SPECIAL REPORT is compiled from data supplied by 34 producers representing 94.58 per cent of the steelmaking capacity in the U. S.

Bold face type indicates totals are not complete.

	Rated Ingot Capacity Net Tons		Ingot Production Net Tons		Steel Operating Rate, Per Cent		Net Income Per Ton Ingots Produced	
	1960	1959	1960	1959	1960	1959	1960	1959
United States Steel Corp.	41,916,000	41,916,000	27,281,088	24,445,353	65.09	58.32	$11.15	$10.41
Bethlehem Steel Corp.	23,000,000	23,000,000	15,941,104	14,257,356	69.31	61.99	7.60	8.22
Republic Steel Corp.	12,742,000	12,742,000	7,699,737	7,504,624	60.43	58.90	6.86	7.18
Jones & Laughlin Steel Corp.	8,125,000	8,000,000	5,768,000	4,896,000	70.99	61.20	5.75	6.02
National Steel Corp.	7,000,000	7,000,000	5,751,699	5,331,496	82.17	76.16	7.29	10.30
Armco Steel Corp.	6,800,000	6,400,000	4,964,200	5,128,907	73.00	80.14	14.19	15.03
Youngstown Sheet & Tube Co.	6,750,000	6,750,000	4,176,256	4,100,717	61.87	60.75	6.16	7.55
Inland Steel Co.	6,500,000	6,500,000	5,111,825	4,227,317	78.64	65.04	9.20	11.44
Kaiser Steel Corp.	2,933,000	2,933,000	1,706,826	1,537,802	58.19	52.43	4.81‡	4.81‡
Colorado Fuel & Iron Corp.[25]	2,836,500	2,836,500	1,592,978	1,682,541	56.16	59.32	3.01‡	2.59
Wheeling Steel Corp.	2,400,000	2,400,000	1,600,839	1,397,002	66.70	58.21	5.17	5.03
McLouth Steel Corp.	2,040,000	2,040,000	1,769,992	1,215,693	80.33[12]	59.59	9.29	8.27
Sharon Steel Corp.	1,866,000	1,861,000	886,015	973,844	47.48	52.33	1.28	2.20
Pittsburgh Steel Co.	1,620,000	1,560,000	1,006,867	935,411	62.15	59.96	1.02	1.06‡
Granite City Steel Co.	1,440,000	1,440,000	1,143,193	1,307,970	79.39	90.83	9.73	12.34
Crucible Steel Co. of America	1,433,180	1,431,180	766,173	886,726	53.46	61.96	1.62	6.89
Northwestern Steel & Wire Co.[11]	1,152,000	825,000	629,775	638,203	54.67	77.36	9.33	13.24
Acme Steel Co.	1,100,000	1,100,000	629,036	401,542	57.19	36.50	3.51	9.01
Detroit Steel Corp.[28]	1,000,000	900,000	638,649	824,757	63.86	91.64	5.70	15.97
Lukens Steel Co.	930,000	930,000	592,216	568,244	63.68	61.10	8.36	4.57
Allegheny Ludlum Steel Corp.	912,000	864,200	477,747	460,785	52.38	53.32	18.32	24.50
Phoenix Steel Corp.	846,760	846,760	315,108	556,030	37.21	65.67	[14]	[14]
Alan Wood Steel Co.	800,000	800,000	540,977	749,254	67.62	92.53	2.66	6.56
Lone Star Steel Co.	800,000	800,000	507,356	751,477	63.42	93.93	4.63	18.86
Copperweld Steel Co.	660,000	660,000	[14]	[14]	[14]	[14]	[14]	[14]
Universal-Cyclops Steel Corp.	637,410	577,410	487,596	552,897	76.50	95.75	8.93	16.39
Keystone Steel & Wire Co.[21]	600,000	600,000	422,148	502,271	70.36	83.71	12.70	17.74
Laclede Steel Co.	600,000	600,000	496,588	600,384	82.76	100.06	7.87	9.38
Continental Steel Corp.	420,000	420,000	368,802	388,365	87.81	92.47	11.74	14.57
Atlantic Steel Co.	325,000	400,000	225,373	217,744	69.35	54.44	4.03	6.20
Carpenter Steel Co.[23]	171,500	171,500	108,854	90,402	63.47	52.71	60.37	47.29
Eastern Stainless Steel Corp.	80,000	80,000	49,179	53,752	61.47	67.19	36.25	58.57
Vanadium-Alloys Steel Co.[23]	47,600	47,600	18,026	14,465	37.87	30.39	131.68	141.73
Jessop Steel Co.[31]	35,740	35,740	25,443	31,016	71.19	86.78	29.74	60.30
Totals	140,519,690	139,467,890	93,699,665	87,221,347	67.00	62.84	$8.33	$9.24

	Number of Shares of Common Stock Outstanding		Common Stock Valuation		Preferred Stock Valuation	
	1960	1959	1960	1959	1960	1959
United States Steel Corp.	54,003,307	53,961,007	$900,555,117	$899,350,117	$360,281,100	$360,281,100
Bethlehem Steel Corp.	45,487,528	45,455,208	555,950,145	554,572,345	93,388,700	93,388,700
Republic Steel Corp.	15,708,454	15,693,074	157,189,161	157,035,361	None	None
Jones & Laughlin Steel Corp.	7,852,283	7,834,092	78,033,000	77,832,000	29,357,000	29,357,000
National Steel Corp.	7,582,460	7,538,643	75,824,600	75,386,430	None	None
Armco Steel Corp.	14,797,013	14,795,516	147,970,126	147,955,157	None	None
Youngstown Sheet & Tube Co.	3,485,017	3,477,905	113,077,143	112,586,010	None	None
Inland Steel Co.	17,576,986	17,444,272	121,960,478	117,170,361	None	None
Kaiser Steel Corp.	3,282,866	3,279,123	3,282,866	3,279,123	55,588,225	56,531,575
Colorado Fuel & Iron Corp.[25]	3,892,630	3,739,967	19,380,477	18,617,161	7,416,415[8]	7,965,925[8]
Wheeling Steel Corp.	2,107,330	2,095,528	21,073,300	20,955,280	32,908,700	34,297,500
McLouth Steel Corp.	3,485,404	1,722,877	8,713,510	4,307,192	1,153,150	11,543,800
Sharon Steel Corp.	1,106,267	1,104,649	11,123,060	11,106,880	None	None
Pittsburgh Steel Co.	1,586,595	1,586,595	15,865,950	15,865,950	24,194,300[8]	24,194,300[8]
Granite City Steel Co.	4,286,885	4,274,923[9]	26,793,031	26,718,268	316,200	730,700
Crucible Steel Co. of America	3,831,997	3,865,631	47,669,000	48,320,000	9,988,200	9,988,500
Northwestern Steel & Wire Co.[11]	2,502,113	2,502,113	12,510,565	12,510,565	None	None
Acme Steel Co.	2,801,256	2,797,310	28,012,560	27,973,100	11,500,000[8]	7,250,000
Detroit Steel Corp.[28]	3,921,753	3,916,899[29]	3,921,753	3,890,586	None	1,500,000
Lukens Steel Co.	953,928	953,928	3,179,760	3,179,760	None	None
Allegheny Ludlum Steel Corp.	3,883,470	3,869,654	3,883,470	3,869,654	None	None
Phoenix Steel Corp.	1,083,817	1,036,877	4,335,268	4,354,736	None	None
Alan Wood Steel Co.	696,007	696,007	6,960,070	6,960,070	4,839,800	4,839,800
Lone Star Steel Co.	3,923,788	3,567,080	3,923,788	3,567,080	None	None
Copperweld Steel Co.	1,176,312	1,175,447	5,881,560	5,877,235	None	[19]
Universal-Cyclops Steel Corp.	1,935,813	1,729,430	1,935,813	1,729,430	None	None
Keystone Steel & Wire Co.[21]	1,875,000	1,875,000	2,604,167	2,604,167	None	None
Laclede Steel Co.	206,250	206,250	4,125,000	4,125,000	None	None
Continental Steel Corp.	1,032,802[22]	516,401	7,229,614	7,229,614	None	None
Atlantic Steel Co.	396,500	396,500	2,000,000	2,000,000	700,000	700,000
Carpenter Steel Co.[23]	1,874,620	918,910	9,373,100	4,594,550	None	None
Eastern Stainless Steel Corp.	1,441,574	1,441,170	3,603,935	3,602,925	None	None
Vanadium-Alloys Steel Co.[23]	642,456	625,661	3,217,060	3,130,000	None	None
Jessop Steel Co.[31]	681,672	643,803	681,672	643,803	None	None
Totals	221,132,153	216,737,450	$2,411,840,119	$2,392,899,910	$631,631,790	$642,568,900

*Credit. ‡Debit. NA=Not Available.

[1] Excluding amount maturing in one year.

[2] After federal income taxes but before interest on long term debt.

[3] Based on average capitalization.

[4] Includes set-asides of $6,390,000 in 1960 and $6,325,000 in 1959 for future income taxes.

[5] Includes special credit of $3,288,870.

[6] Adjusted for 3-for-1 stock split in April, 1959.

[7] Includes credit of $180,000 received from other members of tax return group and set-aside of $250,000 for future income taxes.

FINANCIAL ANALYSIS OF

Net Income Per Ton Ingot Capacity 1960	Net Income Per Ton Ingot Capacity 1959	Capitalization Per Ton Ingot Capacity 1960	Capitalization Per Ton Ingot Capacity 1959	Average Number Employed 1960	Average Number Employed 1959	Total Employment Costs 1960	Total Employment Costs 1959	Long Term Debt[1] 1960	Long Term Debt[1] 1959	1960
$7.26	$6.07	$88.86	$86.80	225,081	200,329	$1,699,987,592	$1,576,203,415	$422,778,670	$454,447,447	$2,041,031,287
5.27	5.10	77.81	77.90	140,819	129,384	945,732,419	860,031,928	140,411,000	149,479,000	999,840,101
4.15	4.23	74.01	64.11	55,927	64,173	410,261,761	404,220,496	214,728,451	94,885,537	571,069,894
4.08	3.69	82.54	84.25	41,035	35,614	298,082,000	260,312,000	133,181,000	149,245,000	430,086,000
5.99	7.84	100.30	97.45	27,870	26,441	235,969,149	219,991,506	189,513,555	191,308,555	436,774,112
10.36	12.04	125.81	132.04	36,820	40,307	294,715,793	295,099,267	158,850,000	174,599,000	548,657,111
3.81	4.59	93.44	84.63	26,986	29,651	191,010,542	180,260,649	165,329,221	115,110,518	352,321,555
7.24	7.44	106.97	104.26	29,657	30,680	198,801,193	179,201,667	209,265,000	215,427,700	364,084,719
2.80‡	2.52‡	139.49	131.07	10,727	11,602	81,264,928	71,515,000	269,554,137	232,577,116	80,697,753
1.69‡	1.54	77.07	80.14	17,620	20,053	124,723,570	121,043,096	75,306,700	78,318,700	116,495,188
3.45	2.93	98.47	99.40	13,216	12,246	98,063,111	88,105,032	29,284,200	31,118,600	153,054,836
7.46[12]	4.93	71.08[12]	78.42	4,108	4,207	34,796,657	27,107,225	60,342,000	67,420,000	86,413,160
0.61	1.15	46.39	48.79	6,400	7,245	46,064,321	45,362,619	9,000,000	10,400,000	66,445,464
0.63	0.64‡	70.80	74.57	7,740	9,371	66,651,051	62,302,075	28,257,940	29,603,370	46,385,826
7.72	11.21	96.53	93.27	5,000	5,139	37,526,196	40,087,176	36,581,287	36,758,581	75,311,090
0.87	4.27	113.78	107.31	12,821	14,774	92,844,000	93,755,000	33,061,000	20,589,000	72,353,000
5.10	10.24	40.74	53.52	2,916	2,790	19,544,210	22,322,997	5,400,000	6,000,000	29,018,587
0.20	0.33	10.44	9.60	6,517	7,517	NA	37,592,000	34,000,000	28,000,000	41,354,000
3.64	14.64	91.51	106.22	3,812	3,924	29,314,572	31,095,220	18,000,000	20,000,000	69,583,513
5.32	2.79	74.04	78.53	4,805	5,156	37,784,493	32,805,143	18,824,000	26,517,095	46,849,185
9.59	13.06	167.43	177.29	12,773	13,700	101,882,832	90,187,059	42,209,600	44,036,600	106,603,436
[14]	[14]	[14]	[14]	2,846	2,951	14,622,199	19,666,251	18,557,572	8,324,260	17,823,901
1.80	6.07	65.53	46.66	3,650	3,824	26,870,016	28,920,226	15,000,000	None	25,623,862
2.93	17.72	121.79	127.11	3,300	4,536	28,057,470	32,712,851	30,402,538	37,000,000	63,108,047
[14]	[14]	[14]	[14]	5,188	5,515	41,962,200	46,540,256	18,493,184	18,630,168	41,922,931
6.83	15.69	139.01	139.18	5,423	5,675	39,307,721	42,281,461	22,500,000	22,500,000	64,170,368
8.93	14.85	80.11	77.43	2,847	3,128	21,612,041	25,790,310	None	None	45,461,075
6.51	9.39	66.63	59.87	3,857	4,027	26,394,195	29,739,993	5,400,000	3,600,000	30,451,494
10.31	13.47	76.97	73.10	2,640	2,612	15,606,372	17,194,601	1,400,000	1,600,000	23,697,569
2.80	3.37	55.06	45.02	1,592	1,553	10,367,830	10,040,345	3,550,000	4,050,000	11,645,311
38.31	24.93	322.89	286.89	4,198	4,155	34,038,975	28,188,029	6,000,000	6,000,000	40,001,971
22.28	39.35	427.69	378.43	1,596	1,595	11,536,246	12,353,632	8,567,500	5,117,700	22,044,090
49.87	43.07	486.59	467.47	1,760	1,734	10,917,530	9,239,014	2,302,000	2,434,000	17,642,785
21.17	52.33	545.55	455.02	1,408	1,322	11,454,522	11,504,301	5,772,921	3,281,321	13,043,443
$5.57	$5.82	$89.85	$87.77	732,955	716,930	$5,337,767,707	$5,052,771,840	$2,431,823,476	$2,288,379,268	$7,151,065,664

Book Value Per Share of Common Stock 1960	Book Value Per Share of Common Stock 1959	Number of Common Stockholders 1960	Number of Common Stockholders 1959	Number of Preferred Stockholders 1960	Number of Preferred Stockholders 1959	Preferred Dividend Requirements 1960	Preferred Dividend Requirements 1959	Net Earnings Per Common Share 1960	Net Earnings Per Common Share 1959	Dividends Per Share on Preferred 1960	Dividends Per Share on Preferred 1959	
$54.44	$52.32	274,918	268,247	61,114	61,928	$25,219,677	$25,219,677	$5.16	$4.25	$7.00	$7.00	$
34.20	34.08	209,154	186,581	17,765	18,290	6,537,209	6,537,209	2.52	2.44	7.00	7.00	
46.36	46.01	90,915	89,644	None	None	None	None	3.36	3.43	None	None	
64.71	63.23	55,411	51,638	5,806	5,870	1,468,000	1,468,000	4.04	3.58	5.00	5.00	
67.60	65.11	NA	NA	None	None	None	None	5.53	7.28	None	None	
47.08	45.32	70,554	70,920	None	None	None	None	4.76	5.21	None	None	
133.54	131.16	19,549	17,593	None	None	None	None	7.38	8.90	None	None	
27.65	26.50	36,000	32,400	None	None	None	None	2.68	2.77	None	None	
25.58	29.07	7,810	7,880	11,735	12,084	3,251,229	3,300,113	3.49‡	3.26‡	1.98	1.97	N
34.91	37.71	27,275	26,793	1,735[8]	1,850[8]	428,012[8]	463,661[8]	1.34‡	1.04	5.25[8]	5.25[8]	
82.63	82.63	13,705	12,789	4,831	4,848	1,645,435	1,714,875	3.15	2.54	5.00	5.00	
27.29	47.03	7,822	6,481	2	2	705,785	899,362	4.51	5.32	2.625	2.625	N
70.12	72.79	8,044	8,271	None	None	None	None	1.02	1.94	None	None	N
39.24	39.41	5,859	5,833	2,962[8]	2,927[8]	1,308,148[8]	1,308,148[8]	0.18‡	1.45‡	10.50[8]	10.50[8]	N
23.82	22.65[9]	12,874	10,736	1	1	24,901	52,242	2.59	3.76[9]	5.50	5.50	
31.32	31.82	16,231	15,231	3,419	3,368	524,000	293,000	0.19	1.44	5.25	2.94	
16.60	15.25	2,678	2,399	None	None	None	None	2.35	3.38	None	None	
24.76	25.17	25,077	24,898	37	16	485,937[8]	351,469	0.61	1.17	7.375[8]	5.75	
18.74	19.05	13,735	8,545	None	1	90,000	135,880	0.90	3.33	6.00	6.00	
52.45	48.76	3,546	3,209	None	None	None	None	5.19	2.72[13]	None	None	
28.45	28.21	19,833	18,944	None	None	None	None	2.25	2.92	None	None	
20.45	23.73	11,403	11,788	None	None	None	None	1.81‡	2.03	None	None	N
46.82	46.68	2,093	1,932	595	597	241,990	241,990	1.72	6.63	5.00	5.00	
17.08	18.13	17,478	15,239	None	None	None	None	0.60	3.97	None	None	
40.64	40.58	8,755	8,451	None	[19]	None	91,005	2.08	5.00	None	5.56[19]	
34.15	32.49[20]	4,841	3,512	None	None	None	None	2.25	5.09[20]	None	None	
25.63	24.78	4,635	4,480	None	None	None	None	2.86	4.75	None	None	
167.64	156.70	1,752	1,728	None	None	None	None	18.94	27.31	None	None	
29.94[22]	56.36	3,969	3,408	None	None	None	None	4.19[22]	10.95	None	None	
34.41	33.44	1,989	2,090	246	259	45,997	45,997	2.18	3.29	7.00	7.00	
26.34	23.51[30]	7,441	6,461	None	None	None	None	3.51	2.33[30]	None	None	
17.79	17.46	6,132	5,318	None	None	None	None	1.24	2.18	None	None	
32.47	31.67	3,525	3,140	None	None	None	None	3.69	3.28	None	None	
20.13	20.16	4,650	4,625	None	None	None	None	1.11	2.91	None	None	
....	....	999,653	941,204	110,248	112,041	$41,976,320	$42,122,628	$3.35	$3.55	....	....	

[8] Includes two classes of preferred stock.
[9] Adjusted for 2-for-1 stock split on Jan. 22, 1960.
[10] After adjustment for previous and future years.
[11] Fiscal year ended July 31.
[13] Based on average capacity of 2,203,333 net tons.
[13] Income does not include special credit of $1,590,347 for adjustments for prior years.
[14] Comparisons would be misleading because company's operations include fabricating divisions with no steel ingot capacity.
[15] Declared stock dividend of 5 per cent.
[16] Includes set-aside of $206,000 for future income taxes in 1960 and credit of $17,000 in 1959.

OF THE STEEL INDUSTRY FOR 19

Surplus 1960	Surplus 1959	Total Capitalization 1960	Total Capitalization 1959	Provision for Depreciation, Depletion 1960	Provision for Depreciation, Depletion 1959	Total Income—Per Cent of Capitalization[2] 1960	Total Income—Per Cent of Capitalization[2] 1959	Interest on Long Term Debt 1960	Interest on Long Term Debt 1959
041,031,287	$1,924,096,165	$3,724,646,174	$3,638,174,829	$208,424,291	$189,854,452	8.62	7.48	$16,942,052	$17,647,717
999,840,101	994,353,908	1,789,589,946	1,791,793,953	94,160,702	97,541,623	6.96	6.77	3,295,284	4,156,373
571,069,894	564,964,658	942,987,506	816,885,556	36,371,446	34,666,022	6.20	7.07	5,646,550	3,849,910
430,086,000	417,532,000	670,657,000	673,966,000	46,130,000	48,005,000	5.81	5.19	5,824,000	5,527,000
436,774,112	415,487,144	702,112,267	682,182,129	41,149,055	36,487,856	7.09	8.96	7,871,034	6,255,025
548,657,111	522,533,000	855,477,237	845,087,157	40,162,979	36,937,862	8.99	9.82	6,478,773	5,896,451
352,321,555	343,576,513	630,727,919	571,273,041	26,964,810	25,505,695	5.06[3]	6.25[3]	4,682,474	4,215,663
364,084,719	345,100,106	695,310,197	677,698,167	41,010,000	35,208,330	7.96	8.33	8,266,598	8,097,677
80,697,753	92,050,613	409,122,981	384,438,427	31,169,846	28,795,515	0.82	1.21	11,562,776	12,064,224
116,495,188	122,420,901	218,598,780	227,322,687	12,526,946	12,723,538	0.14‡	3.59	4,492,065	3,786,858
153,054,836	152,196,561	236,321,036	238,567,941	13,958,752	14,674,809	3.95	3.48	1,058,611	1,262,665
86,413,160	76,712,915	156,621,820	159,983,907	9,443,774	14,105,539	11.69	7.57	3,908,985	4,280,293
66,445,464	69,296,208	86,568,524	90,803,088	3,765,422	3,791,389	1.79	2.87	413,486	462,341
46,385,826	46,667,499	114,704,016	116,331,119	8,648,919	8,074,608	2.26	0.49	1,565,088	1,567,030
75,311,090	70,104,050	139,001,608	134,311,599	6,276,792	6,556,861	9.30	13.27	1,805,176	1,687,017
72,353,000	74,688,000	163,070,200	153,585,500	8,310,000	9,223,000	1.48	4.52	1,181,000	843,000
29,018,587	25,647,435	46,929,152	44,158,000	2,433,445	2,321,004	13.10	19.89	275,973	332,150
41,354,000	42,425,000	114,866,560	105,648,100	4,777,000	3,583,000	3.27	4.70	1,546,000	1,349,000
69,583,513	70,210,395	91,505,266	95,600,981	4,467,579	4,465,788	5.15	15.05	1,071,467	1,209,526
46,849,185	43,331,902	68,852,945	73,028,757	3,767,850	3,377,804	8.97	4.77	1,228,341	883,680
106,603,436	105,303,887	152,696,506	153,210,141	8,325,831	8,551,837	6.87	8.38	1,746,929	1,542,925
17,823,901	20,250,714	40,716,741	32,929,710	2,021,060	1,684,545	3.18‡	8.18	668,432	583,251
25,623,862	25,529,855	52,423,732	37,329,725	2,811,177	4,497,535	3.91	13.65	611,126	239,592
63,108,047	61,116,971	97,434,373	101,684,051	5,041,655	4,959,423	4.20	16.39	1,746,554	2,493,279
41,922,931	41,819,960	66,297,675	66,327,363	3,281,665	3,032,350	5.11	9.84	945,012	555,138
64,170,368	56,136,945	88,606,181	80,366,375	5,429,053	4,529,258	5.45	11.67	987,072	690,020
45,461,075	43,851,738	48,065,242	46,455,905	1,872,272	1,654,005	11.15	19.18	None	None
30,451,494	28,195,405	39,976,494	35,920,405	1,684,318	1,467,012	10.32	16.19	218,403	181,146
23,697,569	21,873,686	32,327,183	30,703,300	1,475,046	1,388,381	13.59	18.66	65,750	73,250
11,645,311	11,257,828	17,895,311	18,007,828	692,359	739,108	6.52	9.09	257,174	288,228
40,001,971	38,606,752	55,375,071	49,201,302	2,697,897	2,768,431	12.35	9.24	270,000	270,000
22,044,090	21,554,168	34,215,525	30,274,793	1,231,422	1,186,860	6.33	11.55	383,175	348,258
17,642,785	16,687,543	23,161,845	22,251,543	808,816	552,987	10.76	9.75	117,836	118,750
13,043,443	12,337,211	19,498,036	16,262,335	501,531	369,759	5.84	12.45	381,423	153,721
151,065,664	$6,917,917,636	$12,626,361,049	$12,241,765,714	$681,903,710	$653,281,186	7.10	7.51	$97,514,619	$92,911,158

ds Per referred 1959	Dividends Per Share on Common 1960	Dividends Per Share on Common 1959	Federal Income Taxes 1960	Federal Income Taxes 1959	Total Assets 1960	Total Assets 1959	Current Assets 1960	Current Assets 1959	C 1960
$7.00	$3.00	$3.00	$270,000,000	$233,000,000	$4,626,849,343	$4,559,137,420	$1,395,842,376	$1,423,773,079	$787,747,7
7.00	2.40	2.40	130,000,000	123,000,000	2,274,957,167	2,269,382,851	1,050,972,908	1,118,322,076	394,067,2
None	3.00	3.00	50,400,000	52,800,000	1,121,082,370	1,014,870,722	425,459,360	400,351,602	143,027,1
5.00	2.50	2.50	23,064,000	27,594,000	1,332,556,000	1,315,504,000	230,021,000	277,078,000	95,997,0
None	3.00	3.00	42,300,000	58,250,000	848,729,371	842,803,631	269,739,967	366,993,919	110,787,3
None	3.00	3.00	64,872,212	75,862,114	1,003,668,441	1,021,681,077	550,393,193	533,951,597	116,152,4
None	5.00	5.00	24,250,000[4]	31,600,000[4]	755,250,611	715,864,170	276,159,493	315,774,294	88,432,6
None	1.60	1.53⅓[6]	44,250,000	39,150,000	769,458,411	778,266,624	208,612,768	248,948,201	62,829,0
1.97	None	0.40	None	70,000[7]	467,357,566	475,093,151	99,234,499	91,170,433	35,884,5
5.25[8]	26	26	1,532,700[27]	3,723,600	281,072,739	293,250,052	116,042,974	128,519,849	32,062,0
5.00	3.00	3.00	5,783,000	4,209,000	272,577,604	278,087,118	114,142,386	115,797,888	27,203,6
2.625	None	None	17,800,000	5,600,000	198,536,774	200,992,828	83,143,771	82,314,110	41,914,9
None	None	None	570,000	1,787,000	97,672,987	109,029,688	46,993,925	57,028,842	11,104,4
10.50[8]	None	None	1,132,000	394,000[9]	151,816,981	157,162,377	52,646,309	55,722,681	24,908,9
5.50	1.40	1.05[9]	11,978,000[10]	17,230,000[10]	190,683,921	185,936,963	56,250,786	67,691,679	28,926,6
2.94	0.80	0.80	880,000[9]	4,900,000	182,426,000	187,562,000	75,838,000	93,209,000	18,280,0
None	1.00	0.90	7,010,000	9,200,000	61,755,733	53,521,422	26,238,424	18,932,417	8,727,0
5.75	1.00	1.15	2,188,000[33]	3,308,000	148,520,000	132,859,000	63,028,000	60,871,000	27,654,0
6.00	1.75	1.60	4,370,000	11,896,000	120,187,595	126,079,452	41,320,825	47,833,522	10,040,3
None	1.50	1.00	4,192,000	2,770,000	81,922,440	85,504,610	32,007,804	33,097,256	9,121,4
None	2.00	2.00	9,542,000	11,960,000	182,530,163	190,234,819	96,984,578	112,128,759	27,236,8
None	None	15	2,261,000[9]	2,475,000	59,171,113	51,137,159	26,999,082	29,810,264	7,723,0
5.00	1.60	1.40	488,000[16]	4,118,000[16]	64,167,099	50,908,919	16,110,472	17,868,095	8,763,6
None	17	17	2,527,000[18]	14,598,000[18]	136,824,565	148,831,428	56,863,657	66,522,889	12,732,4
5.56[19]	2.00	2.00	2,500,000	6,336,000	77,623,694	80,427,491	36,481,387	43,764,618	10,693,5
None	1.14	0.94[20]	4,605,000	9,145,000	100,149,945	100,570,316	43,983,403	53,562,141	11,543,7
None	2.00	2.00	5,351,185	9,256,741	63,998,368	64,232,276	20,012,741	21,286,843	15,933,1
None	8.00	8.00	4,210,000	6,400,000	47,626,310	44,105,881	25,952,432	24,818,459	7,089,8
None	2.42[22]	4.50	4,975,000	6,275,000	37,069,336	36,498,662	21,354,764	20,799,922	3,386,5
7.00	1.20	0.60	1,205,500	1,635,000	22,641,515	22,613,698	9,545,286	9,675,185	3,472,1
None	1.80	1.00[30]	6,890,000	4,603,000	64,008,532	60,579,776	32,960,512	30,582,798	8,416,1
None	0.90	0.86	1,969,000	3,415,000	39,791,063	37,808,329	29,611,216	27,260,451	5,575,5
None	2.00[24]	1.60	2,512,000	2,026,000	27,599,811	26,535,641	14,939,683	14,912,909	4,437,9
None	32	32	906,000	2,329,375	23,013,672	22,407,819	13,517,518	14,337,813	3,515,6
....	....	....	$749,132,397	$790,127,830	$15,933,297,240	$15,739,481,370	$5,659,405,499	$6,024,712,591	$2,205,389,1

[17] Stock dividend of 10 per cent.
[18] Includes credit of $1,510,000 in 1960 and set-aside of $966,000 for future income taxes in 1959.
[19] Two classes of preferred stock recalled Dec. 14, 1959.
[20] Based on 1,781,313 shares outstanding to adjust for 3 per cent stock dividend.
[21] Company operates on fiscal year ending June 30. Data adjusted to calendar year.
[22] Reflects 2-for-1 stock split.
[23] Fiscal year ended June 30.
[24] Plus stock dividend of 3 per cent.
[33] All data based on income for 1960 include loss of $3,606,104

1960

Compiled by **STEEL**

April 3, 1961

Net Sales 1960	Net Sales 1959	Net Profit—Per Cent of Net Sales 1960	Net Profit—Per Cent of Net Sales 1959	Net Income 1960	Net Income 1959	
$3,698,494,931	$3,643,040,035	8.22	6.99	$304,170,990	$254,563,401	United States Steel Corp.
2,208,954,823	2,079,082,467	5.49	5.64	121,179,549	117,235,859	Bethlehem Steel Corp.
1,053,873,006	1,076,832,407	5.01	5.00	52,846,373	53,890,116	Republic Steel Corp.
778,752,000	765,672,000	4.26	3.85	33,153,000	29,485,000	Jones & Laughlin Steel Corp.
697,063,036	736,978,650	6.02	7.45	41,937,235	54,897,360	National Steel Corp.
937,998,519	1,022,428,742	7.51	7.54	70,459,281	77,064,249	Armco Steel Corp.
584,300,280	617,889,289	4.40	5.01	25,719,166	30,956,040	Youngstown Sheet & Tube Co.
755,721,239	713,215,002	6.23	6.78	47,050,611	48,354,030[5]	Inland Steel Co.
207,278,027	202,126,940	3.96‡	3.66‡	8,215,842‡	7,401,076‡	Kaiser Steel Corp.
249,108,729	280,288,103	1.93‡	1.56	4,802,729‡	4,364,554	Colorado Fuel & Iron Corp.[25]
227,790,669	211,633,718	3.63	3.32	8,277,364	7,033,050	Wheeling Steel Corp.
216,628,693	177,446,839	7.59	5.67	16,438,135	10,058,232	McLouth Steel Corp.
116,093,716	119,760,979	0.97	1.79	1,131,882	2,145,593	Sharon Steel Corp.
143,865,008	150,647,405	0.71	0.66‡	1,026,475	994,310‡	Pittsburgh Steel Co.
137,328,462	164,371,219	8.10	9.82	11,121,328	16,142,341	Granite City Steel Co.
210,965,000	219,229,000	0.59	2.79	1,240,000	6,106,000	Crucible Steel Co. of America
67,258,342	83,781,108	8.73	10.09	5,873,265	8,450,321	Northwestern Steel & Wire Co.[11]
140,876,000	134,156,000	1.57	2.70	2,208,000	3,616,000	Acme Steel Co.
89,446,690	117,886,109	4.07	11.18	3,638,720	13,174,715	Detroit Steel Corp.[28]
103,152,067	83,178,393	4.80	3.12	4,948,175	2,598,496[13]	Lukens Steel Co.
240,266,997	232,559,479	3.64	4.85	8,750,209	11,290,664	Allegheny Ludlum Steel Corp.
37,781,532	60,615,789	5.19‡	3.48	1,962,089‡	2,108,754	Phoenix Steel Corp.
62,805,176	81,074,208	2.29	5.99	1,437,108	4,855,885	Alan Wood Steel Co.
55,213,395	112,944,477	4.25	12.55	2,347,184	14,175,678	Lone Star Steel Co.
114,795,018	138,364,827	2.13	4.32	2,441,781	5,972,457	Copperweld Steel Co.
111,467,124	127,694,091	3.90	7.10	4,352,622	9,061,057	Universal-Cyclops Steel Corp.
63,550,197	82,838,545	8.43	10.76	5,359,338	8,911,383	Keystone Steel & Wire Co.[21]
70,248,910	87,671,707	5.56	6.42	3,906,089	5,632,652	Laclede Steel Co.
46,420,427	57,083,835	9.32	9.91	4,328,427	5,657,052	Continental Steel Corp.
28,066,335	29,433,860	3.24	4.58	909,280	1,349,526	Atlantic Steel Co.
85,141,287	69,056,163	7.72	6.19	6,571,012	4,274,850	Carpenter Steel Co.[23]
62,111,337	67,221,402	2.87	4.68	1,782,758	3,148,131	Eastern Stainless Steel Corp.
30,758,706	27,076,982	7.72	7.57	2,373,663	2,050,100	Vanadium-Alloys Steel Co.[23]
31,849,249	33,350,926	2.38	5.61	756,776	1,870,354	Jessop Steel Co.[31]
$13,665,424,927	$13,806,156,696	5.73	5.88	$782,755,136	$812,098,514	Totals

Current Liabilities 60	Current Liabilities 1959	Ratio of Current Assets to Current Liabilities 1960	Ratio of Current Assets to Current Liabilities 1959	Working Capital 1960	Working Capital 1959	
47,771	$808,234,693	1.77—1	1.76—1	$608,094,605	$615,538,386	United States Steel Corp.
57,221	393,188,898	2.67—1	2.84—1	656,905,687	725,133,178	Bethlehem Steel Corp.
27,108	165,177,317	2.97—1	2.42—1	282,432,252	235,174,285	Republic Steel Corp.
97,000	109,767,000	2.40—1	2.52—1	134,024,000	167,311,000	Jones & Laughlin Steel Corp.
37,398	125,396,314	2.43—1	2.93—1	158,952,569	241,597,605	National Steel Corp.
52,481	146,616,799	4.74—1	3.64—1	434,240,712	387,334,798	Armco Steel Corp.
32,692	114,891,129	3.12—1	2.75—1	187,726,801	200,883,165	Youngstown Sheet & Tube Co.
29,049	91,760,406	3.32—1	2.71—1	145,783,719	157,187,795	Inland Steel Co.
34,585	68,304,724	2.77—1	1.33—1	63,349,914	22,865,709	Kaiser Steel Corp.
52,005	39,020,633	3.62—1	3.29—1	83,980,969	89,499,216	Colorado Fuel & Iron Corp.[25]
03,697	29,742,865	4.20—1	3.89—1	86,938,689	86,055,023	Wheeling Steel Corp.
14,954	41,008,921	1.98—1	2.01—1	41,228,817	41,305,189	McLouth Steel Corp.
04,463	18,226,600	4.23—1	3.13—1	35,889,462	38,802,242	Sharon Steel Corp.
08,965	27,367,258	2.11—1	2.04—1	27,737,344	28,355,423	Pittsburgh Steel Co.
26,685	30,640,556	1.94—1	2.21—1	27,324,101	37,051,123	Granite City Steel Co.
30,000	31,605,000	4.15—1	2.95—1	57,558,000	61,604,000	Crucible Steel Co. of America
27,045	3,360,422	3.01—1	5.63—1	17,511,379	15,571,995	Northwestern Steel & Wire Co.[11]
54,000	21,802,000	2.28—1	2.79—1	35,374,000	39,069,000	Acme Steel Co.
10,329	10,841,516	4.12—1	4.41—1	31,280,496	36,992,006	Detroit Steel Corp.[28]
21,495	8,487,853	3.51—1	3.90—1	22,886,309	24,609,403	Lukens Steel Co.
56,890	34,429,862	3.56—1	3.26—1	69,747,688	77,698,897	Allegheny Ludlum Steel Corp.
23,087	8,522,868	3.50—1	3.50—1	19,275,995	21,287,396	Phoenix Steel Corp.
53,656	10,863,889	1.84—1	1.64—1	7,346,816	7,004,206	Alan Wood Steel Co.
32,400	19,966,962	4.47—1	3.33—1	44,131,257	46,555,927	Lone Star Steel Co.
03,539	13,515,363	3.41—1	3.24—1	25,787,848	30,249,255	Copperweld Steel Co.
33,764	20,203,941	3.81—1	2.65—1	32,439,639	33,358,200	Universal-Cyclops Steel Corp.
13,127	17,776,372	1.26—1	1.20—1	4,079,614	3,510,471	Keystone Steel & Wire Co.[21]
09,816	7,610,476	3.66—1	3.26—1	18,862,616	17,207,983	Laclede Steel Co.
06,559	4,226,986	6.31—1	4.92—1	17,968,205	16,572,936	Continental Steel Corp.
02,116	3,700,556	2.75—1	2.61—1	6,073,170	5,974,629	Atlantic Steel Co.
06,112	11,128,030	3.92—1	2.75—1	24,544,400	19,454,768	Carpenter Steel Co.[23]
75,538	7,533,536	5.31—1	3.62—1	24,035,678	19,726,915	Eastern Stainless Steel Corp.
07,966	4,284,098	3.37—1	3.48—1	10,501,717	10,628,811	Vanadium-Alloys Steel Co.[23]
05,636	6,145,484	3.84—1	2.33—1	10,001,882	8,192,329	Jessop Steel Co.[31]
09,149	$2,455,349,327	2.57—1	2.45—1	$3,454,016,350	$3,569,363,264	Totals

on sale of Claymont properties.

[26] Stock dividends of 4 per cent in 1960 and 8 per cent in 1959.

[27] Includes credit of $549,600 on current taxes and set-aside of $983,100 for future income taxes in 1960; set-aside of $887,500 for future income taxes in 1959.

[29] Includes Detroit Steel Corp. and Portsmouth Corp. on a "pooling of interests" basis.

[29] Includes 26,313 shares distributed in December, 1960, to minority stockholders in liquidation of Portsmouth Corp.

[30] Adjusted for 100 per cent stock dividend in October, 1959.

[31] Includes operating subsidiaries.

[32] Declared 6 per cent stock dividend.

[33] Does not include $2,280,000 of recoverable income tax.

Swedes Push Oxygen Steelmaking

Sweden Sets Steel Records

(In thousands of tons)

	1960	1959
Ingot Production	3,541	3,148
Exports	584	521
Imports	1,249	947

SWEDISH steelmakers plan to invest $66.6 million annually in new plant and equipment in the first half of the sixties and about $50 million a year during the last half. Investment during 1958 and 1959 was $80 million annually.

Much of the spending will be to expand oxygen process capacity to boost the production of commercial grade steel. The process now accounts for 4 per cent of Swedish capacity. The figure is expected to reach 22 per cent by 1965. By that time, the country's over-all yearly capacity will probably be near 5 million tons.

• **Records Set in Steel**—Sweden's steel production set a record last year; so did its exports and imports of steel (see table). High grade specialty steels are the No. 1 export items, while imports consist chiefly of commercial grades, such as girders, plates, and sheets.

The export rate is expected to double by 1965, despite the possibility of stiffer competition from European, Japanese, and U. S. mills.

• **And Iron Ore**—Iron ore exports also set a record in 1960, hitting 20 million tons compared with 15.6 million tons in 1959. Shipments this year are expected to be even higher since most of the year's output is already under contract.

Close to half of Sweden's ore exports are shipped to West Germany. Belgium and Britain account for 20 per cent each. The balance is divided among France, Holland, Italy, and Japan.

Malaya Offers Good Sales Potential

U. S. manufacturers looking for new foreign markets should re-examine sales possibilities in the Federation of Malaya, suggests the Bureau of Foreign Commerce.

The Federation has the highest per capita income of any Asian country; a relatively prosperous middle class is viewed as a good market for consumer goods.

Prospects for continued high exchange earnings are said to be excellent. An ambitious public development program calls for improvement in transportation and communications and increased electric power. The Malayan government is encouraging private enterprise to establish secondary industries.

• **Market Potential**—The country's needs range from capital equipment for clearing forests, building roads, and developing ports and mines to a diversity of consumer goods used by a mixed Asian and European population.

The bureau also says low cost U. S. machinery is needed to replace hand labor in basic industries in Ceylon.

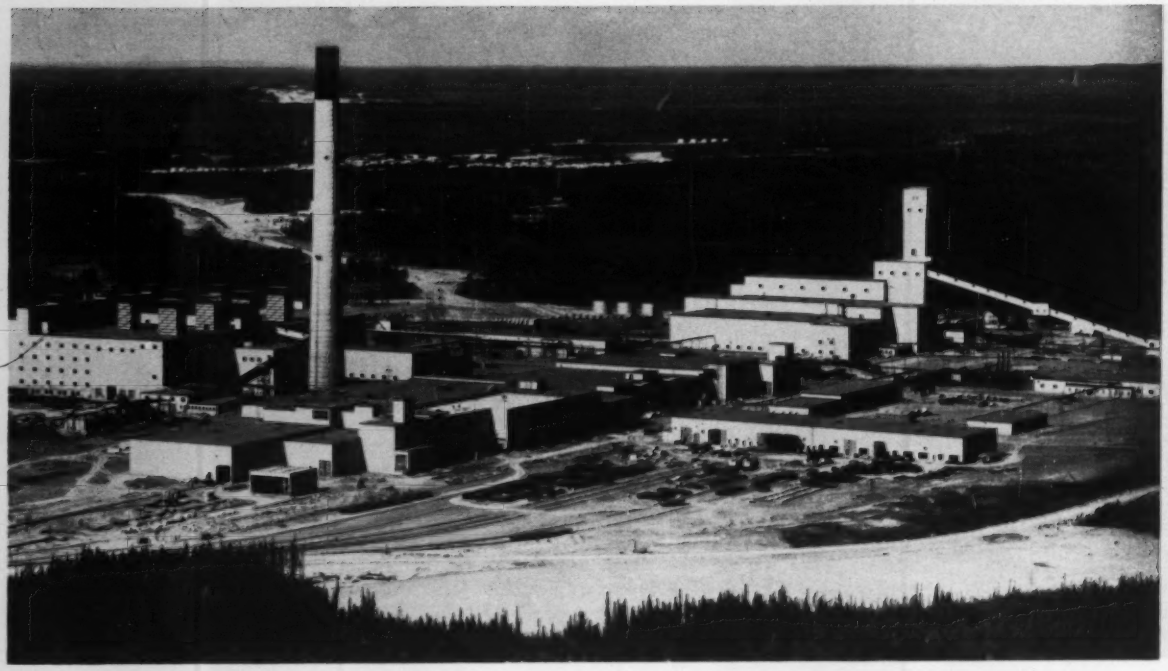
The dependency of the new African nations on efficient air services offers an attractive market for U. S. suppliers of light, general purpose aircraft, adds the Department of Commerce.

International C of C to Meet in May

The International Chamber of Commerce will hold its 18th biennial congress in Copenhagen, May 22-27. More than 1650 delegates from 51 countries, including 150 business leaders from the U. S., are expected to attend. The theme: "Private Enterprise in Economic Development." Delegates will seek agreement on a set of conclusions presented as a world business platform on economic development. Resolutions on international monetary policy, tariffs, taxes, protection of investments, and technical problems of world trade will also be discussed.

Notes from Around the Globe

The German Liberian Mining Co. will proceed with the development of the Bong iron ore range in Liberia, said to have a reserve of at least 200 million tons of hard, fine grained ore containing an average of 40 per cent iron . . . Average weekly rate of British steel production in February was 1 per cent above the February, 1960, level . . . The pickup in Britain's auto industry has enabled some sheetmakers to revert to a normal workweek . . . The U. S. exported 435,000 tons of refined copper in 1960, the highest total since 1928 . . . Switzerland is in a squeeze. Imports jumped sharply last year, and her trade deficit rose by 50 per cent. Talk of revaluing the Swiss franc is stirring hot debate.



Inco's new Thompson, Man., plant starts production, and . . .

Nickel Supply Gets Major Boost

FREE WORLD nickel capacity got a hefty boost last month when International Nickel Co. of Canada Ltd. officially began production at its deposits in Northern Manitoba.

Within a few weeks, Inco's Thompson project will be turning out metal at its capacity rate (75 million lb a year). It is the Free World's second largest producing operation and the only one that is fully integrated.

• **Fills Need**—The Thompson facility provides a cushion for future demand. Free World capacity was badly battered in 1960 when the Cuban government seized U. S. owned nickel facilities with an annual capacity of more than 104 million lb.

The fate of Cuban nickel is clouded—certainly, it won't find its way into the hands of U. S. consumers in the foreseeable future. Freeport Sulphur Co. publicly told stockholders it was writing off its 50-million-lb-a-year Cuban operation. Investment in the Freeport plant totaled $61.5 million (an additional $13.5 million was to have been spent there). Another $44 million went to construct and equip the Port Nickel, La., refinery, which now seems destined to remain idle.

The situation at the 54-million-lb-a-year complex at Nicaro (it's owned by the U. S. government) is equally bleak. Castro seized the facility late last year, and after some verbal sparring with U. S. representatives, his officials broke off negotiations.

Neither facility is being operated today. The Cubans, with the help of Russian technicians, ran the plant for a while. Technical troubles and difficulty in obtaining supplies have since idled it. Freeport Sulphur's operation is too complicated to ever be run by the Cubans, even with outside help, say some observers.

• **Enough Nickel** — Despite the Cuban situation, supplies are said to be adequate, and nickel officials have promised to keep ahead of consumer demand. Free World capacity is 605 million lb (excluding 104 million lb of Cuban nickel). Of that total, International Nickel Co. has a capacity of 385 million lb a year at its Sudbury, Ont., and Thompson facilities.

Plenty of Nickel

(Free World capacity in millions of lb)

1951	286.0
1953	335.2
1955	438.3
1957	489.0
1959	547.0
1961	605.0*

*Does not include 104 million lb of installed capacity in the Nicaro and Freeport Sulphur plants in Cuba which have been seized by the Castro government.

In the U. S., M. A. Hanna Co. has been running a ferronickel operation in Riddle, Oreg., for government account. The contract will expire when Hanna has delivered 125 million lb of ferronickel to stockpile, or in June, 1962, whichever is first. More than 100 million lb have been delivered.

Hanna is currently making plans for complete acquisition of the smelter, subject to negotiations with the government, to enter the ferronickel field as the only U. S. producer of this alloying material.

The only other U. S. nickel producing operation is at Fredericktown, Mo., where the St. Louis Smelting & Refining Div. of National Lead Co. obtains the metal as a byproduct of its lead facility. The plant can turn out about 1 million lb of nickel powder a year.

Nicaro nickel is still available in the U. S. The General Services Administration has about 25 million lb of nickel oxide sinter for sale—it was brought in before seizure of Nicaro by Castro.

If things ever get tight, an added source could be tapped. The government's Defense Production Act inventory holds 96.5 million lb of nickel. Some government sources would like nothing better than to dispose of the metal, but they'll hesitate to do so until a real need exists.

The U. S. is no longer taking any metal into the national stockpile, but modest amounts of nickel are still going into the DPA inventory under "put right" contracts.

• **Future Supply**—As of now, the supply outlook is good. Inco alone, at its Ontario and Manitoba properties, has proved ore reserves of close to 8.4 billion lb. That's enough to supply Free World needs at the 1960 level of consumption for about 20 years. Actually, the reserves are far greater. They've been going up each year as more ore is mined. For example, the Sudbury mines have been operating for 75 years, yet today proved reserves are higher than they were when the operation was started up.

If world demand were to become extremely heavy, Inco could hike its capacity by 10 to 15 per cent for a short time. In time, Inco expects to have its Moak mine, a few miles north of Thompson, in operation.

• **Demand Could Set Record**—In the brief period between the loss of Cuban nickel, and the startup of Thompson, Free World demand was close to production capacity. Free World consumption hit a record 515 million lb last year, thanks mainly to an unprecedented demand from Europe. U. S. consumption dropped a little below the 225 million lb used in 1959.

Another record could be set this year. So far, demand is running about on a par with where it was the second half of 1960. It is expected to improve. In the U. S., demand from steelmakers is creeping up. Buying of nickel base alloys is up slightly. Electroplating demand is down, due mainly to less buying by automakers. Consumer inventories, both here and abroad, remain low, and there seems to be no trend toward any buildup.

• **Price Trend**—The outlook is for continued stability at least through 1961. The price hasn't changed since December, 1956, and the betting is it won't any time soon.

• **Started from Scratch** — The Thompson operation illustrates the lengths to which today's nickel industry will go to stay ahead of demand. Exploration took ten years, cost $10 million, and required 56,000 linear miles of aerial survey. The discovery was made possible by the development of airborne electronic devices, which measure magnetism and conductivity.

When Inco began to construct the Thompson complex four years ago, it had the problem of building an operation in a pine covered wilderness 430 air miles north of Winnipeg where winter temperatures often sink to −60° F. Yet, today, the facility boasts the industry's most modern mine, mill smelter and refinery—a completely integrated operation that will eventually employ 2300 (present employment is 1800).

A 30 mile railway spur was built to hook up with the main Hudson Bay track that goes to Churchill. Inco plans to ship up to half of Thompson's output to Europe via the Churchill Port and Hudson Bay.

To build the Thompson complex, Inco had to plan an entire city—houses, schools, hospital, shopping facilities, churches. Four years ago there was nothing. Today there's a bustling town of 1300 (with another 2500 men living in a temporary construction camp). It's estimated that by the end of 1961, the town's population will be 4500 and eventually it will grow to 8000 or more.

Export-Import Bank O.K.'s Loans for Foreign Projects

The Export-Import Bank of Washington and the government of Peru signed two loan agreements on Mar. 16. A credit of $12 million will assist in financing equipment purchases in the U. S.—it's for work on the Olmos-Bagua-Yurimaguas Highway. An $8 million credit (also for equipment) will assist road building in the Upper Selva area of Peru.

On Mar. 14, Ex-Im Bank authorized a credit of $25 million to the government of Israel which will be used to purchase U. S.-made agricultural equipment, electric power machinery, and items for seaport expansion.

Administration's Tax Plan Shapes Up

STANLEY S. SURREY, new assistant secretary of the treasury for tax policy, has promised Congress that the administration's program for encouraging new plant and equipment investment will be retroactive to Mar. 1, at least.

He told Sen. Vance Hartke (D., Ind.) during the Senate Finance Committee hearing on his confirmation that he was also considering making the plan retroactive to the first of the year. He pointedly remarked that it was not necessary for any businessman to hold up current investment plans until President Kennedy sends his long awaited tax message to Congress. (The message has been promised for almost a month and is now scheduled for "after Easter.")

• **Two Point Program**—Mr. Surrey confirmed STEEL's report (Feb. 6, p. 37) that the administration wants some sort of two step depreciation reform. The tax message will most likely recommend some form of incentive to industry to spend more on plant and equipment. But Mr. Surrey says that this will not be the final answer to the problem of regular "year in year out" depreciation. That question will not be answered for a "number of months" until the Treasury Department's survey of depreciation practices (STEEL, Jan. 16, p. 35) is completely tabulated.

Mr. Surrey, the administration's most important decision maker on tax policy, indicated plans for the incentive program were still not firm as of a week ago. He said a "variety of means" to boost spending were being studied. He admitted some form of liberalized depreciation could be offered, rather than the incentive program so often discussed (STEEL, Mar. 13, p. 82). The suggestion was also made that a credit could be made on new investment without reference to a firm's past buying habits or depreciation practices. Whatever program is decided upon, it will encourage expansion and modernization, but it is not designed as simply an antirecession measure. It will improve the "long range growth" of the country.

• **Stumbling Block** — Mr. Surrey hinted that the administration's tax experts had been arguing among themselves over the form of the incentive.

Some taxmen are worried that they will end up encouraging only those firms with plenty of money to spend. Some firms do not spend up to their depreciation allowance. Others spend large amounts in one year, little in other years.

• **Belgian System** — The treasury taxman discussed the Belgian system. A law of July 15, 1959, provides: Thirty per cent of investment in land, buildings, and equipment in one year may be deducted from net profits (10 per cent a year for three years). The value of the investments is determined by the difference between the amortized value of the new investments and the proceeds from the sale of such assets as land, buildings, equipment and stock, plus the amount of depreciation taken on land, buildings, and equipment.

• **Reaction**—Senator Hartke voiced some worry about the administration's incentive program, indicating that liberals in Congress would be tempted to charge "giveaway" to defeat it. Washington tax observers in industry warn that business had better get behind whatever is offered or fail to gain anything this year. It is generally thought that the second step of the administration's depreciation will not come until next year because of the heavy load of work on the House Ways & Means Committee (where all tax bills must begin).

Senator Hartke continues to favor straight reform and last month offered a bill to cut the useful lives of railroad equipment to 15 years.

• **Surrey's Future** — The Harvard professor, to use Sen. Paul Douglas' (D., Ill.) description, is a believer that those with equal pay should generally pay equal taxes. There he runs into strong conservative opposition, particularly in the Senate. Finance Committee Chairman Sen. Harry Byrd (D., Va.) did his best to cut Mr. Surrey down a few notches by closely questioning him on some of his writings—they have been somewhat critical of Congressional tax policies. Sen. Robert Kerr (D., Okla.) was noticeably worried about the treasury's future attitude toward such tax measures as capital gains.

Mr. Surrey supports a "package" of tax reform which includes closing some of the so-called tax loopholes which have developed over the years. Under heavy committee pressure, however, he retreated to the statement that he would have "an open mind" on all measures.

The President's tax message is now assumed to contain the Surrey incentive program for plant and equipment, cancellation of the dividend credit, a withholding system for taxes on dividends and some forms of interest, a tightening up of tax sparing and tax deferring agreements for foreign investments, and possibly a reduction in the top personal income brackets.

• **Balancing the Loss**—The administration wants to minimize loss of revenue. Treasury Secretary Douglas Dillon puts it this way: The plant and equipment incentive program "will involve a certain amount of loss of revenue and to try compensate for that we will offer certain suggestions—none of them major—looking toward closing so-called loopholes. And that, I think, will be about the extent of tax legislation recommended at this session of Congress."

The secretary advocates looking "at the whole tax structure" in the same manner Ways & Means Committee has been studying it. He describes the President's eventual tax program as "extensive," and hints as special measures for small business, admitting large firms have an advantage over small firms when they try to get money for modernization and expansion.

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Fleet Owners Report on Compacts

FLEET operators have had a full year to evaluate compact versus standard car costs. Results: They've found the smaller vehicles save at least 1 cent a mile in operating costs.

That's a $10,000 saving for the company with 50 fleet cars that are driven an average of 20,000 miles a year.

The National Association of Fleet Administrators (NAFA), reports: Compacts generally seem cheaper to buy and maintain, and they give a better depreciation return than standards. For example, Andrew Lutz of Motor Lease Corp., says adjusted depreciation costs show that his firm is recovering 74 per cent of the cost of its compacts vs. 64 per cent of the bigger car costs on a yearly turnover basis. Its average compact costs $1855; it is worth $1335 when it is turned in a year later. The bigger cars cost an average of $1975 and are worth $1275 when they are traded after a year.

"One reason for the better trade-in prices on the compacts: The smaller cars don't get banged around so much in parking lots, so they're much cleaner when they're turned in," says Mr. Lutz. Taxes and insurance on compacts are also lower, he adds. So are repair and replacement costs. The replacement hood for an average compact costs $40 compared with $56 for a standard car. Fenders run $5 less. Tires cost $13.72, plus taxes, vs. $15.61 for standards.

The fleet experts say there are decided differences in operating costs among compacts. Monthly repair and replacement costs alone vary from $4.96 to $12.20 among the five compacts in one fleet. (NAFA avoids praise of any make. But several members told STEEL that Valiants and Falcons seem to be growing in favor for fleet use.) NAFA figures a quarter of all cars sold each year go into fleet operation.

Monthly Maintenance Costs

(Per unit)

	Compacts	Standards
Oil & Lube	$2.28	$2.44
Repair/Replacement	6.24	6.61
Winterizing*	2.66	2.32
Tires	1.11	2.29
Totals	$12.29	$13.66

*Includes cost of equipping with new snow tires. Based on 1200 unit fleet with 95 per cent full maintenance. Motor Lease Corp., West Hartford, Conn.

• **Compacts Get Bigger Share**—Like consumer sales, fleet sales of the automakers are down substantially this year. However, the compacts are accounting for a bigger share of total fleet sales.

Ford reports that Falcon deliveries have climbed from 21 to 24 per cent of total fleet sales. Valiant's share of the Plymouth-Valiant fleet sales has risen from 22 to 24 per cent. Ramblers account for 60 per cent, and Rambler Americans take about 30 per cent of American Motors Corp.'s fleet sales.

• **P&G Offers Guide** — Procter & Gamble Distributing Co., Cincinnati, was one of the first companies to convert its fleet (1800 cars) to compacts. P&G has developed a budget guide based on a selected 1000 car fleet running 20,000 miles per car per year. It shows that compacts offer 24 per cent operating cost savings over standard vehicles. Although few metalworking firms maintain a fleet of that size, P&G's findings are a tipoff on what you can expect, even with fewer cars in your fleet.

Compact vs. Standard Car Savings

Gasoline	$133,800
Repairs	7,480
Tires	4,930
Oil/lube	4,480
Misc.	520
Total Savings	$151,210

• **Morale Is Problem**—Driving comfort and morale factors are the biggest problems in going to compacts, reports the NAFA. Fleet cars run 20,000 miles or more a year compared with the national average of 9000 miles per car. Under those

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conditions, the shorter wheelbases and inch or two less legroom are bound to add to driver fatigue. One answer, suggest NAFA members, is to reschedule your calls. Break up long trips when it's possible to give drivers a chance to recuperate.

The morale factor is harder to handle. Many salesmen don't like the idea of driving a "cheap" car. Where prestige factors are important to your company's sales effectiveness, compacts probably aren't the answer—unless you go to the fancier models that look better than a stripped standard car. It still isn't known how the fancier compacts stack up in terms of costs.

Muffler Debate Continues; Walker Readies Ceramic Line

WALKER MFG. CO. is installing a ceramic coating line for mufflers at its Racine, Wis., plant. R. I. Hahn, president, tells STEEL the equipment will cost about $500,000. (It'll be ready for 1962 production.) Walker currently supplies American Motors Corp. with its ceramic coated mufflers. It's also market testing four models for replacement sale. Commenting on Detroit reports that the company eventually hopes to offer a 15 per cent price reduction on the coated units, Mr. Hahn says: "I don't think we can name a figure, but price reductions naturally are an aim of any improvement in facilities. It's too early to say just what will happen."

One of the reasons behind Walker's move is that Bettinger Corp., which has been coating the Rambler mufflers for Walker in its Toledo, Ohio, plant, has gone into bankruptcy. To keep the business, Walker either had to find a new coater or do the job itself.

L. H. Shippee, AMC's purchasing director, comments: "We are, of course, aware of the Bettinger situation. We've taken steps to insure that we will be protected on mufflers for '61 and '62 models."

• **Ceramics Fight Stainless** — The move by Walker coincides with a drive by suppliers of ceramic coating materials who are trying to push muffler makers into using their products in competition with the stainless developed by Allegheny Ludlum Steel Corp. (see STEEL, Jan. 16, p. 51). If successful, they'll boost shipments of carbon steel to muffler producers and at the same time cut into sales of aluminized and galvanized steel.

Co-ordinating their efforts through the Porcelain Enamel Institute, the ceramic producers point out that material costs are considerably cheaper than those of MF-1 stainless and no more expensive than aluminized or galvanized steel. The stainless sells for about 28 cents a pound. The other coated steels cost 12 to 14 cents a pound. But plain carbon steel, base for ceramic coatings, can be purchased for 7 cents. The porcelain frit for coating costs about 20 cents per muffler.

The kicker is that any of the other materials can be made on present equipment with little additional capital investment and without redesigning the muffler so the coating will be properly applied. But the ceramic people say they know of a method to coat present mufflers without redesigning them. They add that even the additional coating costs make the ceramic mufflers no more costly than present units.

There seems to be little question that muffler life is extended with either ceramics or stainless. The choice is mainly one of economics. Says Mr. Hahn: "There are units that are better on life, but for the dollars invested, we think the ceramic jobs are best for the customer." Arvin Industries Inc., Columbus, Ind., supplies the part-stainless mufflers for Thunderbird and also for replacement sale. Says Thomas A. Danner, Arvin's engineering vice president: "We aren't committed to stainless permanently. We're studying them all. If our customers want ceramic mufflers, we're prepared to make them."

Manufacturers who concentrate mainly on replacement sales have naturally been reluctant to adopt a longer lasting muffler, but even they are market testing the ceramic jobs.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,387	659,298
March		654,242
April		582,909
May		611,226
June		613,147
July		434,377
August		305,527
September		407,685
October		617,816
November		597,132
December		522,239
Total		6,694,288

Week Ended	1961	1960
Feb. 25	100,331	153,501
Mar. 4	92,024	138,513
Mar. 11	91,202	145,967
Mar. 18	71,083	145,852
Mar. 25	87,641†	137,385
Apr. 1	96,000*	147,830

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Alcoa Studies New Piston

AN EXPERIMENTAL aluminum piston capped with a thin layer of stainless steel has been produced in Aluminum Co. of America's Cleveland laboratories. It has not been engine tested, but it has been sectioned to study Alcoa's pressure bonding process.

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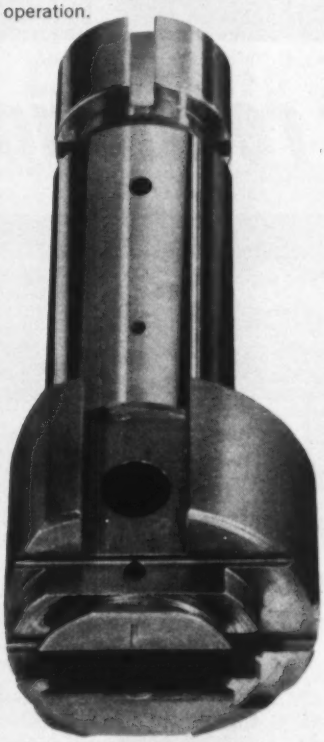

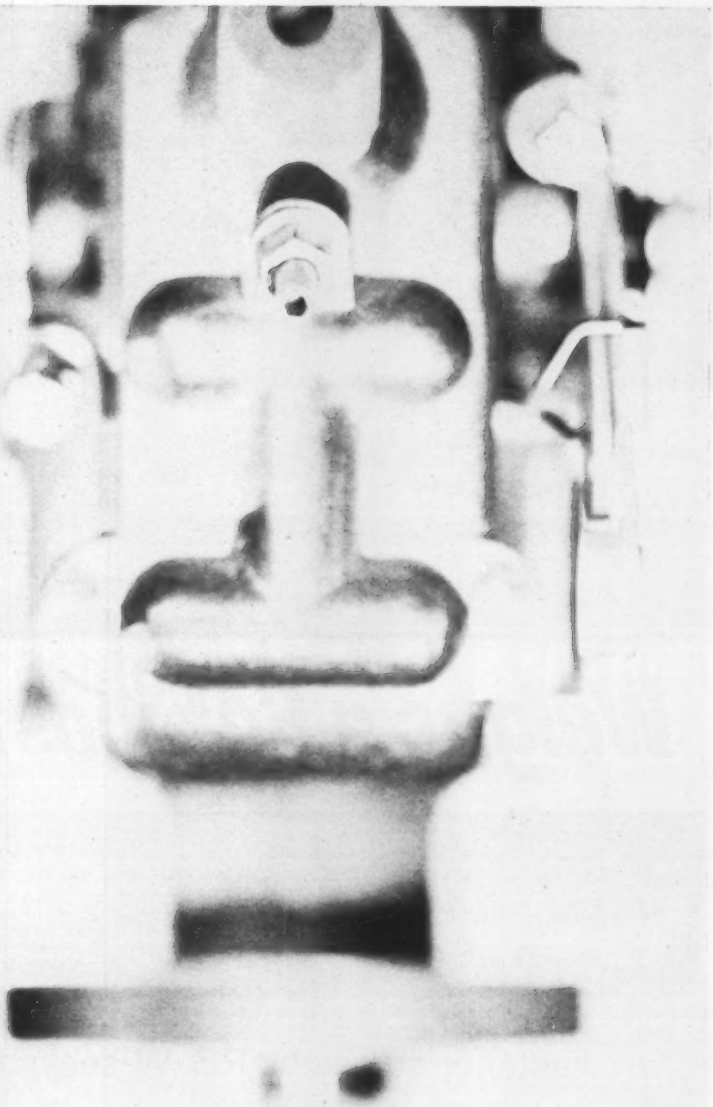

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For example, compare SAE "proof load" and cost ratios of four different hex screws of standard steels.

Grade	SAE Grade 5	SAE Grade 7	SAE Grade 2	SAE Grade 2
Size	¾ x 5"	1 x 5"	1⅛ x 5"	1¼ x 5"
Proof load (lbs)	28,400	16,950	21,350	27,100
Cost Ratio	100%	188%	239%	277%

Almost unbelievable. The smallest—the heat treated RB&W High Strength Hex Screw—exceeds all the others in load capacity, can usually be used instead of any of them. But, since it's smallest and weighs less, it also costs you less. 64% less than the 1¼" Grade 2 screw; 58% less than the 1⅛", etc. And because holes can be made smaller, you save on production, too.

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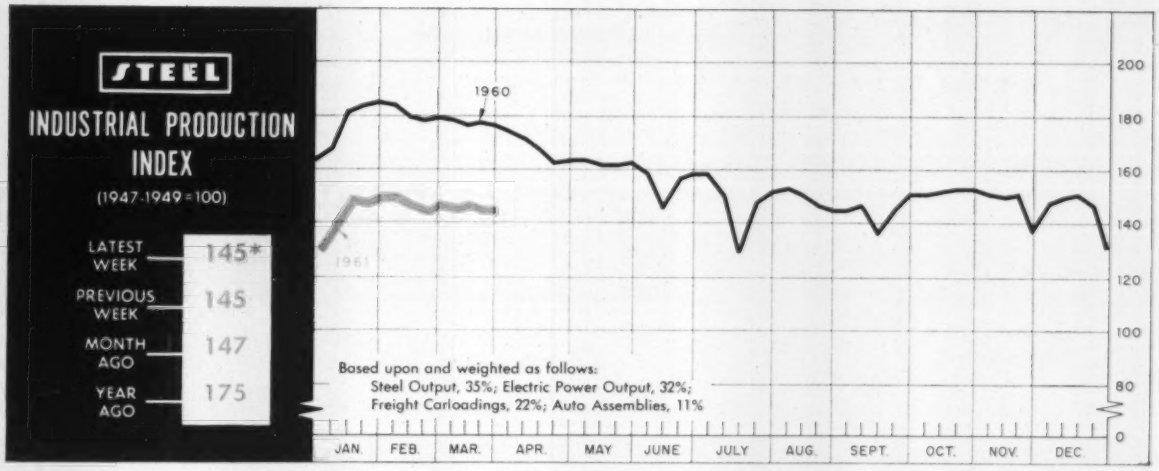


*Week ended Mar. 25.

Economy Easing into Mild Upturn

AS WE ENTER the second quarter, the decline in industrial activity has virtually come to a halt. (See report by STEEL's panel of economic consultants, Page 41.) The turnaround is coming slowly, but greater buoyancy is expected later this year.

Prentice-Hall Inc., Englewood Cliffs, N. J., thinks gross national product will reach the highest level ($513 billion to $517 billion) of any year in U. S. history. The peak will come in the fall quarter, with the big break arriving early in 1962, says Prentice-Hall.

• **Inventory Drop** — "Inventories have been brought into the desired balance with sales in an increasing number of industries," observes Martin R. Gainsbrugh, chief economist, National Industrial Conference Board, New York. "As a result, new orders are being filled increasingly from new production rather than old stock," he reports. (For STEEL's latest survey of component buyers, see Page 115.)

• **Workweek Rise** — "One early manifestation of this trend," explains Mr. Gainsbrugh, "is the steady lengthening of hours of work (seasonally adjusted) in manufacturing during the first quarter. As a result, payrolls have risen.

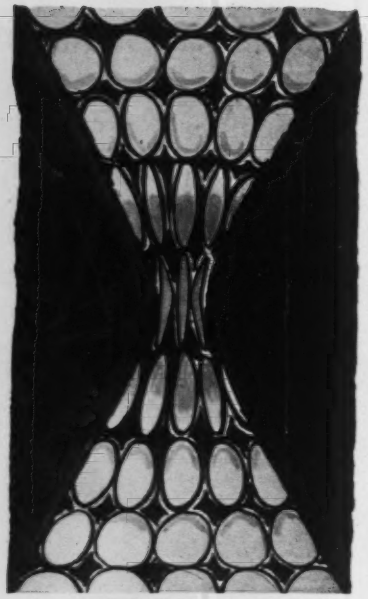
"With the improvement in new order position and rates of production, the lengthening workweek should be shortly followed by an expansion in employment. This is the traditional manner in which recessions in the past have been ended," comments the economist.

• **Point to Upturn** — Mr. Gainsbrugh adds: "This familiar pattern is again emerging, even though such lagging indicators as unemployment and personal income have yet failed

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,620[1]	1,611	2,527
Electric Power Distributed (million kw-hr)	14,200[1]	14,295	13,951
Bituminous Coal Output (1000 tons)	6,450[1]	6,100	8,720
Crude Oil Production (daily avg—1000 bbl)	7,250[1]	7,353	7,078
Construction Volume (*ENR*—millions)	$353.9	$382.4	$453.5
Auto, Truck Output—U. S., Canada (*Ward's*)	117,297[1]	100,679	176,179
TRADE			
Freight Carloadings (1000 cars)	515[1]	507	601
Intercity Truck Tonnage (changes from year ago)	−3.9%	−5.7%	−1.3%
Business Failures (Dun & Bradstreet)	363	318	302
Currency in Circulation (millions)[2]	$31,887	$31,901	$31,671
Dept. Store Sales (changes from year ago)[2]	+9%	+10%	−6%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$30,678	$28,712	$27,169
Federal Gross Debt (billions)	$289.9	$290.4	$289.1
Bond Volume, NYSE (millions)	$39.2	$38.9	$26.3
Stocks Sales, NYSE (thousands of shares)	26,984	26,461	13,594
Loans & Investments (billions, adjusted)[3]	$110.2	$108.7	$102.2
U. S. Govt. Obligations Held (billions)[3]	$30.2	$30.0	$25.1
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	213.5	213.2	231.0
All Commodities[6]	119.8	119.8	120.1
Commodities Other than Farm & Foods[6]	128.0	128.1	128.7

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.



BRMCO 3004 STRIP ALUMINUM MATCHES 5052...

SAVES COMPANIES $40.00 A TON

A top electrical equipment manufacturer, wanting to reduce production costs, asked BRMCO and several other leading mills to develop a 3004 strip aluminum to replace the 5052 they were using. Because of a critical forming operation, they required a tensile strength within 37,000-42,000 psi, with a 5% minimum elongation.

BRMCO field engineers, metallurgists and production men attacked this difficult problem, realigned strip production methods and quickly produced a 3004 strip with the required tensile strength and with an elongation factor well above the minimum requirement.

BRMCO now can save all manufacturers $40.00 a ton in strip aluminum costs by supplying them these 5052 characteristics in a lower cost alloy.

This same technical assistance can cut your nonferrous strip costs, increase your production. Write or call today, without obligation. If you phone, call EDison 7-4434 (Bridgeport—collect) and ask for Larry Hayden, field service department.

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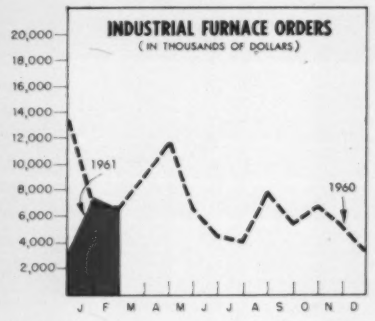
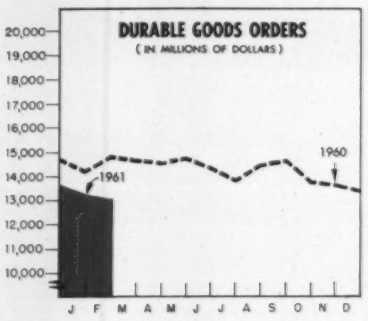
THE BUSINESS TREND





	1961	1960	1959
Jan.	7,291	6,827	4,545
Feb.	6,468	6,499	3,596
Mar.	....	9,033	7,842
Apr.	....	11,687	14,517
May	....	6,352	5,315
June	....	4,245	8,230
July	....	3,966	13,141
Aug.	....	7,840	9,738
Sept.	....	5,253	5,560
Oct.	....	6,634	12,867
Nov.	....	5,084	8,442
Dec.	....	3,248	13,437

Industrial Heating Equipment Assn. Inc.
Charts copyright, 1961, STEEL.

	New Orders*		Sales*	
	1961	1960	1961	1960
Jan.	13,200†	14,190	13,600†	15,450
Feb.	13,000†	14,800	13,300†	15,670
Mar.	.....	14,640	.....	15,170
Apr.	.....	14,470	.....	15,000
May	.....	14,680	.....	15,060
June	.....	14,340	.....	14,880
July	.....	13,840	.....	14,730
Aug.	.....	14,410	.....	14,420
Sept.	.....	14,620	.....	14,410
Oct.	.....	13,740	.....	14,080
Nov.	.....	13,600	.....	13,810
Dec.	.....	13,200	.....	13,600

*Seasonally adjusted. †Preliminary.
U. S. Office of Business Economics.

to respond. In contrast, such sensitive indicators as raw material prices, housing starts, new incorporations, and stock prices have been in an ascending cycle since the start of the year."

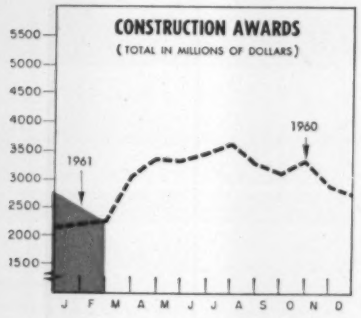
The fact that industrial production will likely lack the vigor of previous postwar upturns reflects, in part, the relative shallowness of the 1960-61 slump. Expansion of total output won't be fast enough to provide all the new jobs necessary to absorb the bulk of the unemployed. Prentice-Hall sees the average jobless rate at 7 per cent of the labor force in 1961—highest for the postwar period.

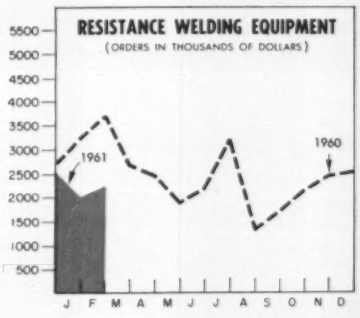
Nevertheless, Mr. Gainsbrugh asserts, on the basis of expectational data in both the consumer and business sectors, economic expansion promises to grow increasingly vigorous in the second half of the year after it gets underway.

• **Consumers Confident** — Consumers have not only kept their expenditures high throughout the recession (thanks, in part, to transfer payments), but have grown increasingly confident about their financial status by midyear. They show a continued willingness to enter the market place, despite the setbacks of the last nine months.

The National Industrial Conference Board's latest survey of consumer intentions reveals that plans to purchase new automobiles and homes are somewhat less than they were early in 1960. The comparison, however, reflects the unusual surge of enthusiasm following the 116 day steel strike. The widespread enthusiasm rubbed off on the public's thinking and buying plans rose to new survey highs. Allowing for this burst of confidence, consumers' buying plans for '61 have held remarkably high, says NICB.

The conclusion is reinforced by the unprecedented confidence that consumers are expressing about the prospects for local business, job opportunities, and family finances in the half year ahead. "Americans have more confidence about their immediate future than at any time in the last two years," states Mr. Gainsbrugh. He adds: "While attitudes about present conditions are at levels associated with past periods of slackness, these attitudes have recently been reversed in a manner identical with past recoveries."





	Total		Building	
	1961	1960	1961	1960
Jan.	2,485	2,193	1,787	1,728
Feb.	2,235	2,240	1,674	1,685
Mar.	....	3,046	....	2,361
Apr.	....	3,360	....	2,527
May	....	3,337	....	2,563
June	....	3,472	....	2,593
July	....	3,597	....	2,481
Aug.	....	3,295	....	2,550
Sept.	....	3,119	....	2,402
Oct.	....	3,319	....	2,555
Nov.	....	2,886	....	2,169
Dec.	....	2,718	....	1,872
Totals	....	36,318*	....	27,345*

*Monthly figures do not add up to totals because of yearend revisions.
F. W. Dodge Corp.

	Net Orders		Shipments	
	1961	1960	1961	1960
Jan.	2,013	3,258	1,731	1,582
Feb.	2,236	3,732	1,916	2,563
Mar.	....	2,653	....	3,011
Apr.	....	2,446	....	2,943
May	....	1,871	....	2,310
June	....	2,205	....	3,267
July	....	3,244	....	2,221
Aug.	....	1,330	....	2,528
Sept.	....	1,689	....	2,559
Oct.	....	2,145	....	2,328
Nov.	....	2,457	....	1,927
Dec.	....	2,525	....	1,974
Totals	....	28,933	....	29,218

Resistance Welder Manufacturers' Assn.

• **Businessmen Sense Upturn**—Businessmen too feel their markets have improved after edging down from the high marks attained at the end of 1959 and the first half of 1960.

The Conference Board's survey of capital appropriations indicates that the gradual curtailment of capital spending decisions from the first to the third quarters of 1960 ground to a halt in the fourth quarter. While outlays continued to shrink, appropriations swelled more than 20 per cent, allowing for normal seasonal trends. The improvement was most pronounced among the machinery industries and nondurables.

In addition, the decline in capital spending decisions in the first nine months of last year was the mildest in the eight year record of the board's survey. It was also the shortest.

The mildness was especially reflected in the relative strength of new orders for industrial machinery throughout the last year. That sector will be bolstered by increased plant and equipment purchases. Mr. Gainsbrugh concludes: "With the sharp upturn in manufacturers' capital appropriations posted in the closing months of 1960, ordering should pick up soon, if, indeed, it has not occurred already."

Trends Fore and Aft

SHIPMENTS by durable goods manufacturers rose 1 per cent in February over the January level and new order receipts increased 2 per cent, reveals the Department of Commerce. The advance was largely due to increased placement of government defense contracts. The backlog of unfilled orders on the books of heavy goods producers remained unchanged from the end of January.

Net new orders in February for industrial heating equipment fell 12 per cent below the January pace but were about the same as a year ago. Total net new orders thus far in 1961 total $13.8 million vs. $13.3 million for the like period of 1960.

State and municipal construction contracts bucked the general easing in private and federal contracting during the week ended Mar. 23.

The Department of Labor's wholesale price index of all commodities other than farm products and foods in February fell 0.5 per cent below the like period of '60.

- CHROME SILICON WIRE
- CHROME VANADIUM WIRE
- CLUTCH SPRING WIRE
- DIE SPRING WIRE
- MB SPRING WIRE
- VALVE SPRING WIRE
- MUSIC SPRING WIRE
- PHOSPHOR BRONZE SPRING WIRE
- STAINLESS SPRING WIRE
- SPRAG WIRE
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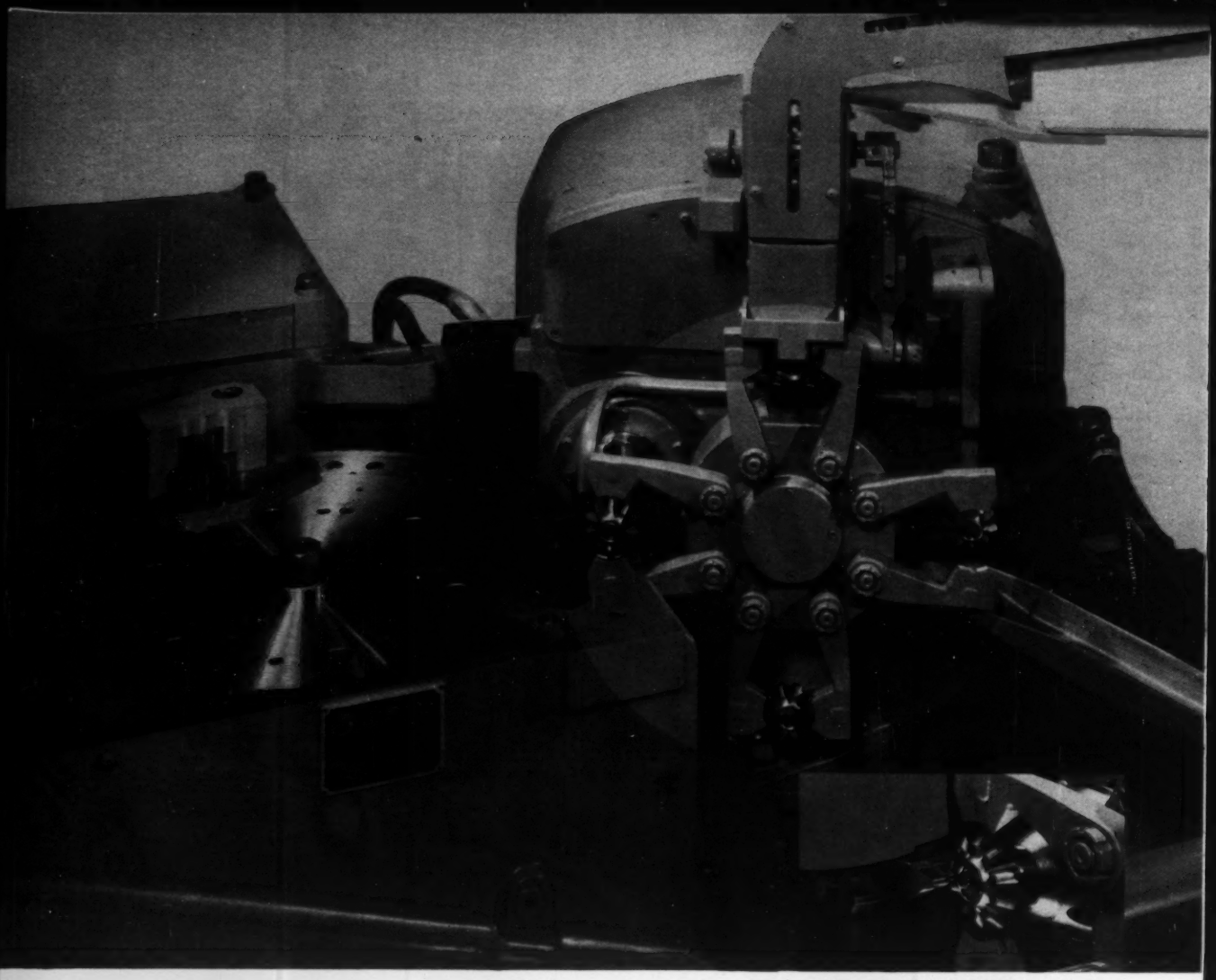
MILLBURY, MASSACHUSETTS

Offices and warehouses: Cleveland, Detroit, Los Angeles, Melrose Park and Millbury



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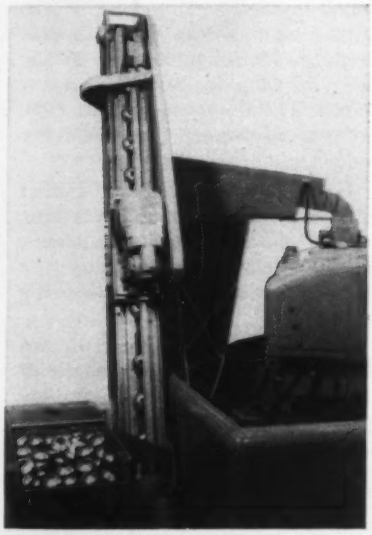
The No. 109 Machine handles a wide range of automotive and farm machinery gears: up to 10″ diameter, 5:1 ratio, 1¼″ face width.

Send for our bulletin for information on both the machine and the Revacycle Method.



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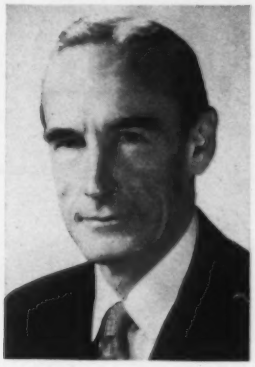
JOHN H. MANGLE
Oliver v. p.-operations

ROBERT H. PRESNALL
Gisholt gen. sales mgr.



FRANCIS R. CURRY
M. H. Treadwell chairman

Samuel D. Harper was made manager of **Minneapolis-Honeywell Regulator Co.**'s newly formed Computer Dept., Special Systems Div. The new, separate department will be responsible for engineering and marketing programs for integrated, industrial process control systems incorporating Honeywell's 290 digital computer. The Special Systems Div. is at Pottstown, Pa.

C. F. Grumley was promoted to corporate director of purchasing and traffic of **J. I. Case Co.**, Racine, Wis. He succeeds **H. J. Maubert**, vice president-purchasing and traffic, who resigned to join Arthur D. Little Inc., Boston. **B. R. Getman** replaces Mr. Grumley as manager of purchasing at the Clausen Works.

E. L. Weaver was named manager of contracts for **Springfield Boiler Co.**, Springfield, Ill., purchased by Cleaver-Brooks Co.

Thomas L. McKnight was elected president of **United States Chemical Milling Corp.**, Manhattan Beach, Calif.

J. Russell Britt was promoted to director-research and development, **Granite City Steel Co.**, Granite City, Ill. He is responsible for development of new flat rolled steel products, and improvement of existing products.

Olin Mathieson Chemical Corp. appointed **J. J. Forst** assistant product manager of the Metals Div.'s aluminum pig, ingot, and billet product department. He was purchasing manager, metals and electricals.

John H. Mangle was elected vice president-operations, **Oliver Corp.**, Chicago. He has worked with Oliver since November in its transition to a wholly owned, separately operated subsidiary of White Motor Co., of which he was an assistant executive vice president.

Effective June 24, **Robert H. Presnall** will succeed **Robert H. Bruce** (vice president-sales) at **Gisholt Machine Co.**, Madison, Wis. Mr. Bruce will act in an advisory capacity until his retirement. Mr. Presnall has been appointed general sales manager.

Cloice E. Temple was made purchasing agent for **Allis-Chalmers Mfg. Co.**'s Norwood, Ohio, Works. Former purchasing agent, Gadsden, Ala., Works, he succeeds **Roy N. Miller**, who remains at Norwood in an advisory capacity until retirement in July.

Robert D. Howse was elected vice president-marketing, **Bell Intercontinental Corp.**, New York.

Frederick R. Gruner was made director of engineering for operations at the East Moline, Ill., plant of **American Machine & Metals Inc.**

Walter M. Gates was made manager of the St. Johnsbury, Vt., Works of **Fairbanks, Morse & Co.** He was manager of manufacturing services at the pump plant in Kansas City, Kans. He succeeds **J. M. Pascoe**, who was named assistant to C. E. Clausen, vice president-general manager of the Scale Div., Fair Lawn, N. J.

Francis R. Curry was elected chairman and chief executive officer of **M. H. Treadwell Co. Inc.**, New York, to succeed **F. J. Lantry**, retired.

Robert C. Tyo was elected to the newly created post of vice president-DeWalt operations, **Black & Decker Mfg. Co.**, Towson, Md. Mr. Tyo was recently elected to the presidency of DeWalt Inc., Lancaster, Pa., a Black & Decker subsidiary.

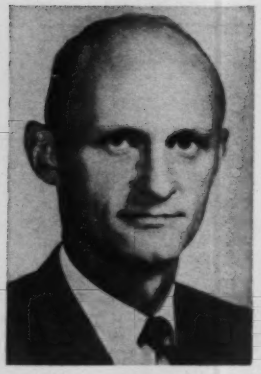
Henry W. Bonneau was made sales manager, **Robinson Pneumatic Conveyor Div.**, Morse Boulger Inc., New York.

Milton Deaner was made assistant sales manager, Metals Div., **Arthur G. McKee & Co.**, Cleveland.

Hugh A. McCloskey, former vice president-operations, Hammarlund Mfg. Co. Inc., was made general manager of **Richardson-Allen Corp.**, New York, subsidiary of Kollsman Instrument Corp.

Daniel J. Coughlin was appointed general sales manager, **Brewer-Titchener Corp.**, Cortland, N. Y. He succeeds **Frederic A. Celler**, who resigned to join the International Div. of AMP Inc. **Raymond J. Considine** replaces Mr. Coughlin as sales manager, Marine & Industrial Hardware Div.

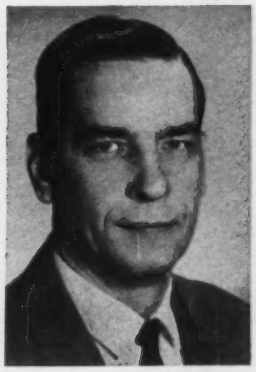
Walter C. Rueckel was made vice president, **Wilputte Coke Oven Div.**, Allied Chemical Corp., New York. He was vice president-general manager, Engineering & Construction Div., Koppers Co., and



GLENN HERZ

JAMES L. WOODLEY

Hyster engineering, manufacturing v. p.'s



EDWARD KIBBITT

FRANK E. MONTIE

appointments at Brown & Sharpe Mfg.

was also vice president and sales manager, Henry J. Kaiser Co.

Glenn Herz and **James L. Woodley** were elected vice presidents of **Hyster Co.**, Portland, Oreg. Mr. Herz was named vice president-engineering; Mr. Woodley vice president-manufacturing.

Vernon B. Benfer, former president of PacAero Engineering Corp., was made general manager of the new General Ultrasonics Div. of **Acoustica Associates Inc.**, Garden City, N. Y.

Samuel A. Leone was promoted to regional sales manager-direct sales by **Colson Corp.**, Chicago. He joined Colson six years ago, and served as manager of its Conveyor Div., Elyria, Ohio, as well as sales manager, Special Products Div.

Robert A. Hall was made director of connector operations for the newly formed Data Recorders Div. of **Consolidated Electrodynamics Corp.**, Pasadena, Calif. **James D. Cunningham** fills the new post of manager, Connector Engineering Dept.

Dr. Donald M. Allison Jr. was named president of **Vitro Electronics Div.**, New York, Vitro Corp. of America. He was a senior executive of Bendix Corp. in Washington.

Todd Co., Rochester, N. Y., division of Burroughs Corp., named **Bernard L. Blide** manager of machines and steel products.

Richard T. Dale was made works manager of **Resistoflex Corp.**, Roseland, N. J. He was assistant to the executive vice president.

Brown & Sharpe Mfg. Co., Providence, R. I., appointed **Edward Kibbitt** supervisor of subsidiary operations, Cutting Tool Div. In that capacity, he is in charge of cutter shop operations, sales, engineering and management co-ordination. **Henry A. Szostek** was made Eastern district sales manager (combining North Central and East Coast areas); and **Frank E. Montie** was made factory manager, Greystone plant, in charge of actual manufacturing operations in the Cutting Tool Div. **T. Russell Hall** succeeds Mr. Montie as plant superintendent, Greystone plant.

Ronald L. Vingoe was appointed chief field engineer, Tubular Dept., **National Supply Div.**, Dallas, Armco Steel Corp. He succeeds **Charles C. Brush**, made field engineer at Houston.

Howard C. Robinson was made manager, Middle Atlantic region, **Stanley Steel Strapping Div.** of Stanley Works, New Britain, Conn. His headquarters are in Baltimore.

William Lawrence was made general manager of the San Diego, Calif., facilities of **General Dynamics'** Electronics' Military Products Div. **Howard L. Gates** was made manager of operations.

Youngstown Sheet & Tube Co. named **Walter J. Prochak** superintendent of its Rod, Wire & Conduit Dept. at the Struthers (Ohio) Works. He is succeeded as superintendent, Cold Drawn Bar Dept., at Brier Hill Works, Youngstown, by **Robert M. Wilthew. J. Paul Tierney**, previously superintendent, Bar, Rod & Wire Dept., was named to the company's Service Engineering Dept. as a specialist in those products.

Daniel N. Gredys was named general manager, **Perfection Div.**, Cleveland, Hupp Corp., to succeed **A. J. DeFino**, recently made a group vice president of Hupp. Mr. Gredys was vice president-engineering.

R. J. Hampson, general manager, Transmission & Chassis Div., **Ford Motor Co.**, Dearborn, Mich., was made general manager of Ford Tractor operations. He is succeeded by **Robert Stevenson**, former general manufacturing manager, Engine & Foundry Div.

Robert E. Frankenberg was made service metallurgist at the Louisville, Ohio, plant of **Jones & Laughlin Steel Corp.'s** Stainless & Strip Div. He was assistant chief metallurgist at the York Div. of Borg-Warner Corp.

Stewart R. Chapman was named assistant sales manager-aluminum products for **Rea Magnet Wire Co. Inc.**, Ft Wayne, Ind., subsidiary of Aluminum Co. of America.

C. Edward Bellew was made manager, Manufacturing Div., **Garlock Inc.**, Rochester, N. Y. He succeeds the late **Donald F. Fraser.** For the last two years, Mr. Bellew was vice president and general manager of Baltimore Steel Co.

Karl Brandenberg was made chief engineer of **Modernair Corp.**, San Leandro, Calif. **Walter J. Baum** was made assistant sales manager.

David A. Pritchard was made sales manager for **General Electric Co.'s**

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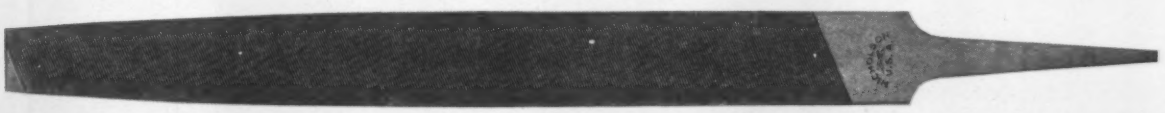
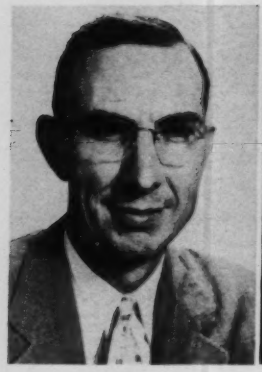
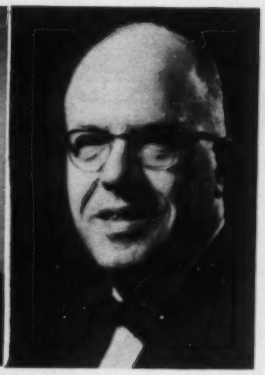




T. A. BEDFORD
Kaiser (Canada) pres.

PHILIP J. BERG
Dravo sales and dev.

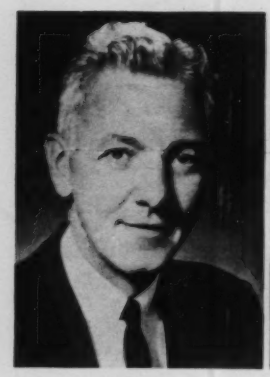


WILLIAM T. NYSTROM
Adamas field sales mgr.

JOHN H. CLARKE
CompuDyne div. v. p.

SHELDON K. TOWSON JR.
Elwell-Parker president

H. C. KORNMAN
Townsend div. v. p.



PARKER VAN DIEN
Union Steel div. sales

JAMES N. COSSITT
Gabriel-Valve Div. sales

ROBERT E. JOHNSTON JR.
Fox Steel Pipe sales v. p.

Wire & Cable Dept., Bridgeport, Conn.

Parker Van Dien was made sales manager, Strip Div. (formerly Hind Steel Co.) for **Union Steel Corp.**, Union, N. J.

C. S. Keller was made manufacturing manager of **Chrysler Corp.'s** casting plant at Kokomo, Ind.

James N. Cossitt was named sales manager, Valve Div., **Gabriel Co.**, Cleveland. He was assistant to the vice president-sales.

Fox Steel Pipe Corp. elected **Robert E. Johnston Jr.** vice president-sales for its newly formed sales organization for marketing electric resistance weld, API line pipe. He has headquarters in Birmingham.

T. A. Bedford was elected president of **Henry J. Kaiser Co.** (Canada) Ltd., Montreal, Que. He was vice president-engineering and construction project development for Kaiser Engineers, division of Henry J. Kaiser Co., Oakland, Calif.

Philip J. Berg was appointed manager-sales and development, Engineering & Construction Dept., Machinery Div., **Dravo Corp.**, Pittsburgh. **J. H. Porteus** was made chief development engineer - ore processing, and will report to Mr. Berg.

William T. Nystrom was made field sales manager of **Adamas Carbide Corp.**, Kenilworth, N. J. He previously had been director of sales, precision tools and gages; and distributor sales manager, Hydraulic Div., for Brown & Sharpe Mfg. Co.

John H. Clarke was elected vice president, Systems Div., **CompuDyne Corp.**, Hatboro, Pa. He was division manager.

Sheldon K. Towson Jr. was elected president and chief executive officer of **Elwell-Parker Electric Co.**, Cleveland. He was vice president-general manger. He succeeds **W. A. Meddick**, now chairman.

H. C. Kornman was named vice president-general manager, Engigineered Fasteners Div., **Townsend Co.**, Ellwood City, Pa. Former assistant general manager of the division, he succeeds **R. E. Casner**, resigned. **P. F. Barry** was made sales manager. **Malcolm Wilson** was made plant manager, Ellwood City.

Boris E. Yarotsky was made assistant to the vice president-operations for administration, a new position with **Crucible Steel Co. of America**, Pittsburgh.

OBITUARIES...

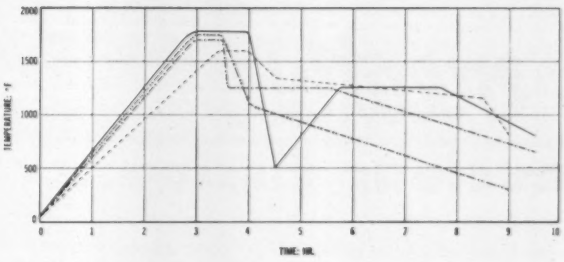
William Glassenberg, 50, director of purchases, **R. Lavin & Sons Inc.**, Chicago, died Mar. 17.

Albert M. Hagen, 67, production manager for **General Cable Corp.**, Perth Amboy, N. J., died Mar. 18.

Norman Leeds Jr., 59, assistant general manager, **Raybestos Div.**, Raybestos-Manhattan Inc., Stratford, Conn., died Mar. 12.

SELECT YOUR PRODUCTION AND DIAL YOUR CYCLE . . .

with this Salem-Brosius Continuous automatic cycle annealing furnace



Salem-Brosius cycle annealing and other heat treating furnaces are engineered to conform to your most exacting product specifications. Wide range heating and cooling cycles can be varied quickly and programmed positively—with a single operator—permitting you to handle a range of heat treating jobs with a single furnace. Such furnaces are built for continuous operation or as batch types, with conventional firing or controlled atmospheres. Your requirements govern design.

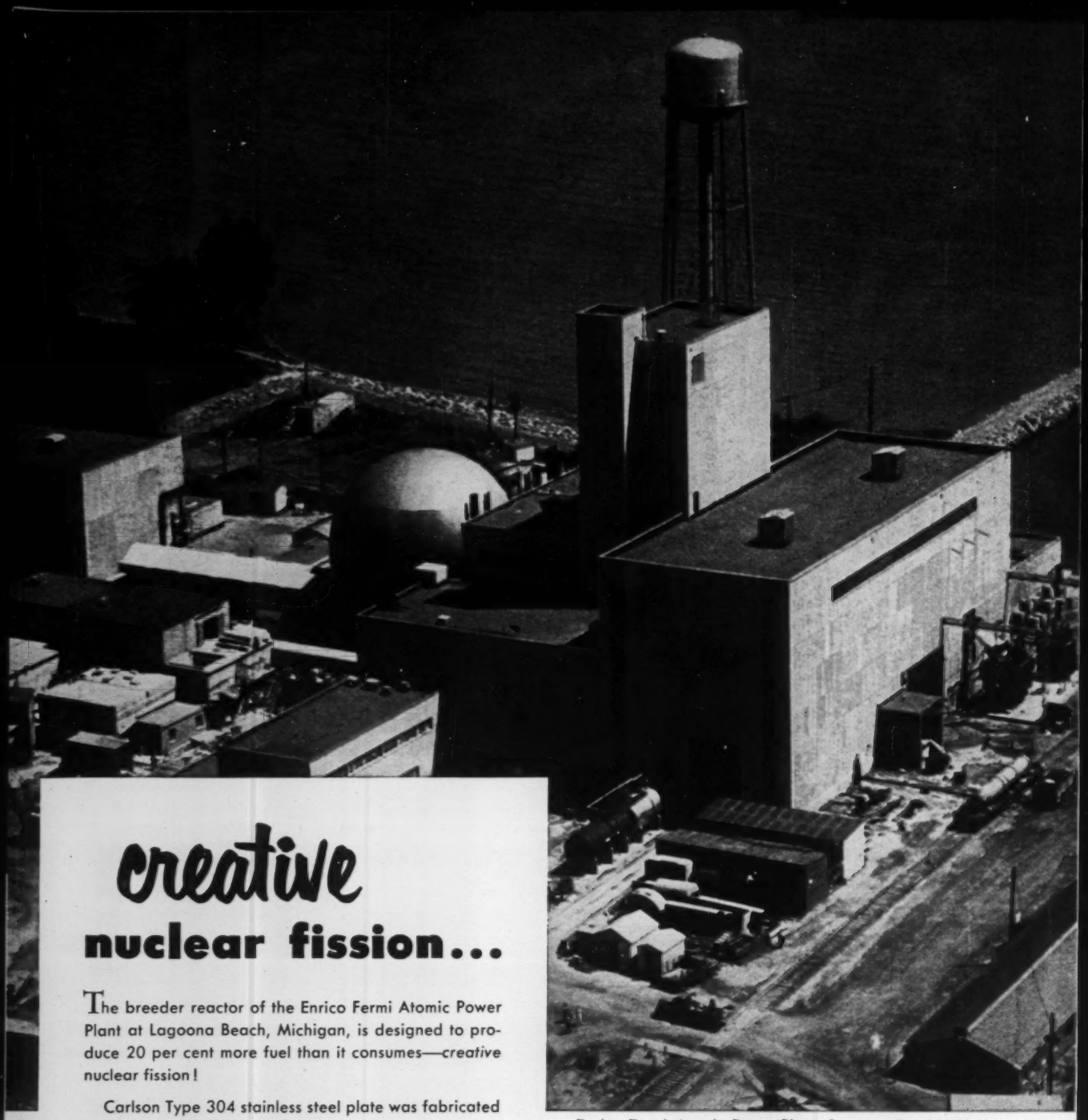
Both in the United States and abroad, Salem-Brosius is recognized for its outstanding design and construction of industrial furnaces—furnaces that yield maximum high-quality output at minimum capital, operating and maintenance costs.

When you need heating or heat treating furnaces, check with Salem-Brosius for advanced design and common-sense construction.

Salem-Brosius, Inc.

PITTSBURGH, PENNSYLVANIA

Salem-Brosius (Canada) Limited, Rexdale, Ontario • Salem-Brosius (England) Limited, London and Milford, England
Salem-Brosius (France) S.A., Paris, France • Salem-Brosius (Luxembourg) S.A. • General Ionics Corp., Pittsburgh, Pa.



creative nuclear fission...

The breeder reactor of the Enrico Fermi Atomic Power Plant at Lagoona Beach, Michigan, is designed to produce 20 per cent more fuel than it consumes—*creative* nuclear fission!

Carlson Type 304 stainless steel plate was fabricated into the reactor vessel by Combustion Engineering, Inc. This plate must withstand the high temperatures and severely corrosive conditions associated with nuclear service.

Carlson specialists, working exclusively with stainless steel, maintain the precise quality standards essential in meeting critical service requirements. Whether you build nuclear power plants, missiles, or corrosion-resistant process equipment, you will find at Carlson a production and on-time delivery service you can trust. We will be glad to work with you on your projects. Write, wire or phone for detailed information.

If you would like a copy of our new booklet, "Producing Stainless Steels . . . Exclusively," please let us know.

Enrico Fermi Atomic Power Plant, Lagoona Beach, Michigan. Reactor section built, owned, and will be operated by Power Reactor Development Company. Conceptual design by Atomic Power Development Associates, Inc. Detail design and construction of reactor vessel by Combustion Engineering, Inc. The turbine-generating plant is built, owned, and will be operated by The Detroit Edison Company.

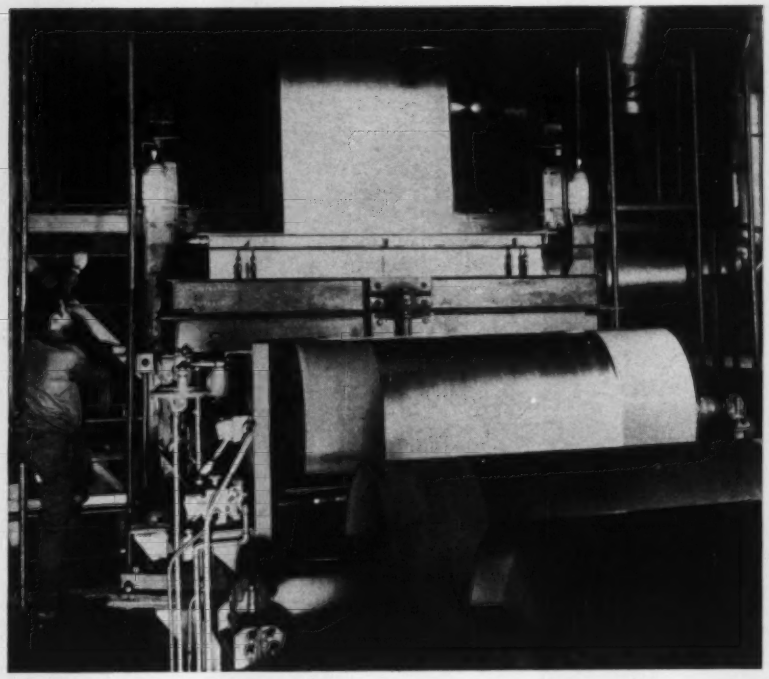
PHOTO COURTESY OF POWER REACTOR DEVELOPMENT COMPANY

G.O.CARLSON Inc.

Producers of Stainless Steel

122 Marshallton Road
THORNDALE, PENNSYLVANIA
District Sales Offices in Principal Cities

Plates • Plate Products • Heads • Rings • Circles • Flanges • Forgings • Bars and Sheets (No. 1 Finish)



48 in. coil gets high speed paint job in . . .

New Coil Finishing Line

A $2 MILLION expansion that includes a continuous enamel coating line for wide coils was recently completed by Litho-Strip Corp., Chicago.

• **Capabilities**—Coatings are applied to strip in a variety of widths and thicknesses and to several base metals. The line, which boosted the company's capacity to 2 million square ft of painted strip a day, can process 20,000 lb aluminum and steel coils in widths of ¼ to 68 in. and thicknesses ranging up to 0.064 in. The strip goes through the line at speeds up to 150 ft a minute.

• **Coatings**—Coatings include: Decorative finishes, such as wood grains and linens; a simulated anodized finish for weather stripping; and a simulated brass coating for housewares.

Vinyls, acrylics, epoxies, and alkyds are applied to one or both sides of the strip in one pass. Coating thickness is controlled within 0.0001 in. Enamel, applied by rubber rollers, is cured at high temperature, cooled by water sprays, and tested for color, gloss, and hardness. The company also has facilities for edge rolling and edge coating.

• **Pretreatment**—Each coil is given appropriate pretreatment for the finish it is to receive. The coil is passed through a series of cleaning and chemical spray treatment tanks for corrosion resistance and paint adhesion. Cold rolled steel is given an iron phosphate treatment; aluminum undergoes a chromate process; and galvanized steel is treated with zinc phosphate. A chemical treatment specialist inspects the

(*Please turn to Page* 70)

BIG Pre-Publication DISCOUNT on NEW Dun & Bradstreet METALWORKING DIRECTORY

The newest—most precise way to positive identification of metalworking plants in the United States—will soon be available through the second annual Dun & Bradstreet METALWORKING DIRECTORY. Newly revised for 1961 the Metalworking Directory lists over 32,000 metalworking and metal producing plants with 20 or more employees, plus—for the first time—metals distributors.

LISTINGS SHOW:

- Name — Address
- Products Made (primary and secondary)
- Management (by name and department)
- Products Used (form in which they are purchased)
- Operations and Processes
- Total Employees
- 4 Digit SIC Codes

Thousands of business concerns use the Directory daily to—locate new customers—prepare mailing lists—accurately measure sales performance against potential—actually increase sales performance.

The Metalworking Directory is indexed 3 ways: alphabetically, by line of business, and geographically. In addition, for precision marketing, a Statistical Summary shows number of plants by line of business and by number of employees in each county in the United States.

The big pre-publication offer is now in effect. For more information on the Metalworking Directory and the substantial saving you can make by ordering NOW, please use the coupon below.

Dun & Bradstreet, Inc.
Marketing Guides Sales Dept.
99 Church Street, New York 8, N. Y.

Yes, we are interested in more information about the Dun & Bradstreet Metalworking Directory and in seeing sample pages.

Name.....
Business Name.....
Address.....
City.....Zone...State.....
Telephone Number.....

Of all steel-wire manufacturers, *only* CF&I offers you high quality steel wire in all the packages shown above. These packages are designed to help you cut downtime . . . ease storage and handling problems . . . and increase daily production.

1. FIBRE DRUMS – 250-600 lbs. capacity. A sturdy container, with a center core, which holds wire of one continuous length. A metal cover and locking band seal the drum and protect the wire from atmosphere and dirt. Wire is withdrawn directly from the drum into your equipment. Two sizes: full and half drum.

2. SHAPED COILS – 1500-2500 lbs. capacity. This heavy coil contains wire of one continuous length, bundled with four steel straps. Will increase production up to 25%.

3. REEL-LESS CORE – 800-1000 lbs. capacity. Reduces shipping expense by eliminating deposit on reels and cost of returning empty metal reels. One continuous length is wound on a cardboard core. When received at your plant, the wire is placed on your aluminum, detachable-flange reel . . . ready for use.

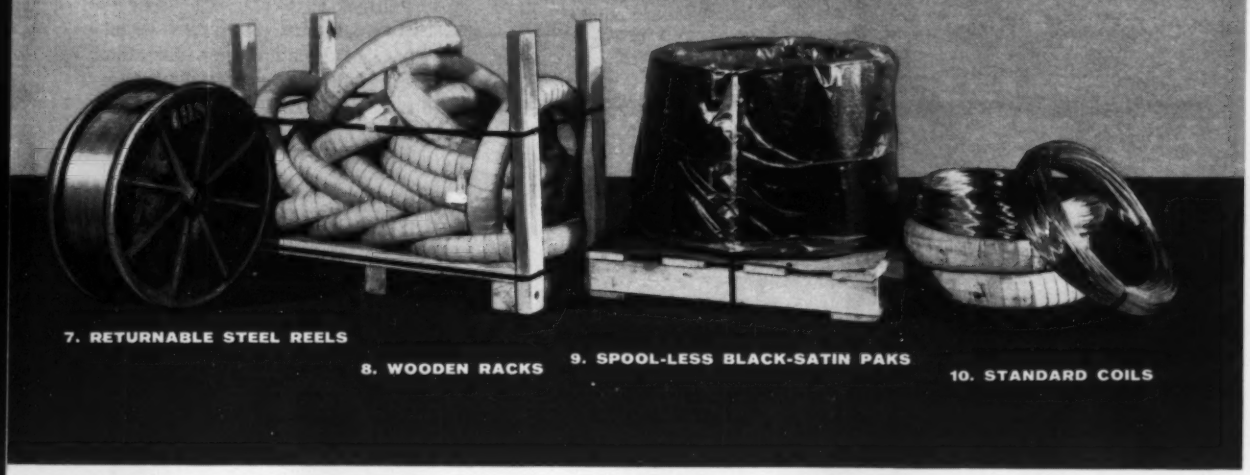
4. RETURNABLE SPIDERS – 2000-3000 lbs. capacity. A sturdy wire carrier consisting of a center core of 2″ steel pipes welded to a heavy base plate. Holds one continuous length of wire, reduces downtime and increases production.

5. DISPOSABLE SPOOLS – 5-70 lbs. capacity. Can be used once and then discarded. Has the advantage of wire on spools with no deposit, no return of empty spools.

6. DISPOSABLE STEM-PAKS® – 500-1000 lbs. capacity. One continuous length of wire on a disposable pallet consisting of a center core attached to a wooden base mounted on 4″ runners. Speeds unloading, handling and increases production.

7. RETURNABLE STEEL REELS – 500-800 lbs. capacity. Holds one continuous length of wire, ready for smooth, even pay-off. Assures you wire free from damage in transit. Because reels require

offers you all ten!



7. RETURNABLE STEEL REELS

8. WOODEN RACKS

9. SPOOL-LESS BLACK-SATIN PAKS

10. STANDARD COILS

less pay-off space, valuable production area can be saved.

8. WOODEN RACKS – 1500-3000 lbs. capacity. Protects coils during shipping and simplifies in-plant handling. Eliminates need for handling individual coils.

9. SPOOL-LESS BLACK-SATIN PAKS – 2000 lbs. capacity. Provides two 1000 lb. continuous lengths of oil tempered wire wound on cardboard cores, palletized and shrouded with polyethylene. Ideal for long production runs. Cuts downtime up to 90%.

10. STANDARD COILS—100-600 lbs. capacity. Packaged for a wide range of industrial uses. They are securely bundled and can be paper-wrapped for protection in transit and storage.

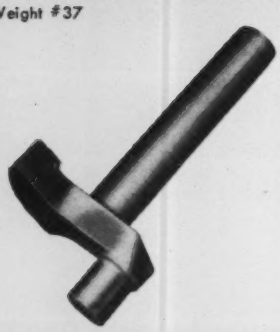
• • •

For more complete information on each of these ten wire packages, we invite you to consult your CF&I sales office.

THE COLORADO FUEL AND IRON CORPORATION
Denver • Oakland • New York
Sales Offices in All Key Cities

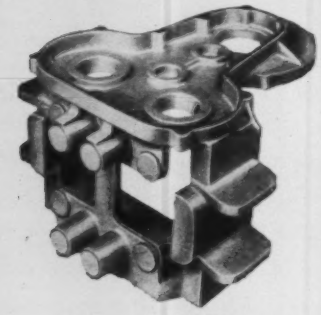
URICK'S DUCTILE IRON

Weight #37

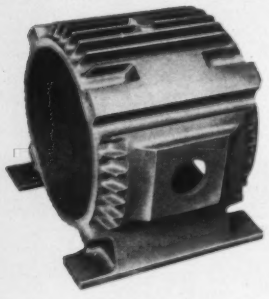


Weight #62

Weight #41



Weight #75



. . . PRODUCTION RUNS with a custom finish

URICK successfully casts many small parts or components of Ductile iron on a production basis.

Because of URICK'S team "know-how" and modern facilities, these precision castings are no longer considered a custom task involving added expense and time, but are mass produced with effective savings.

Naturally URICK'S knowledge of stress, strain, and impact values helps in recommending Ductile where it will serve best. Possibly you have components that URICK can help you convert to Ductile to your advantage.

Remember, castability, weight reduction and reduced machining time with longer tool life, all add up to real economies. Ask URICK about their Ductile recommendations before you decide on your next casting run.

URICK is the foundry that starts with "U" and stays with YOU. Write for bulletins on URICK'S Ductile and Urite casting facilities.

URITE CASTINGS

URICK FOUNDRY

ERIE, PENNSYLVANIA

LICENSED UNDER PATENTS OF THE INTERNATIONAL NICKEL COMPANY., INC.

(*Concluded from Page 67*)

baths regularly to insure proper surface preparation.

Service Centers Formed By Meier and Sandvik

Meier Brass & Aluminum Co., Hazel Park, Mich., has established a subsidiary, Meier Bearing Alloys Inc. The new firm operates a metal service center that handles high quality, high strength bearing materials. Its address: 2919 S. Halsted St., Chicago.

Sandvik Steel Inc. has opened its new service center facilities at 7520 N. Long Ave., Skokie, Ill. The facility augments Sandvik's warehouses at headquarters in Fair Lawn, N. J., and at Cleveland, Detroit and Los Angeles, and its subsidiary Sandvik Canadian Ltd., Montreal, Que.

Florida Plant Operating

Rex of Florida Inc., Ft. Lauderdale, Fla., subsidiary of W. Rex Co., Lansdale, Pa., was established to provide complete heat treating and plating services for manufacturing and processing plants in that area. Facilities include: 18 furnaces, 5 quench tanks, plus controls and testing accessories for treating ferrous and nonferrous metals.

Chicago Warehouse Closed

Bliss & Laughlin, Harvey, Ill., reports that its shipments to service centers gained more percentagewise in 1960 than in any previous year. The company is closing its own service center in Chicago, so it can concentrate on the supply of service centers.

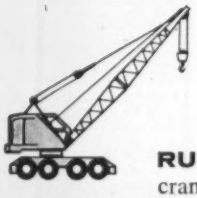
Firms Take New Names

O'Neil-Irwin Mfg. Co., Lake City, Minn., changed its name to Di-Acro Corp. The firm's products include precision metalworking machines, punches and dies, and press brake dies for punch presses and press brakes.

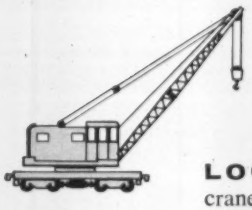
Foundry Services Inc., a Cleveland producer of compounds for treating molten metals, molds, and dies, changed its name to Foseco Inc. The company has also organized a

crawlers . . . rubber . . . rails . . . which will give you lowest-cost yard handling?

CRAWLER cranes give you high flotation and stability for working in unimproved yard areas . . . make spot turns for maneuvering in cramped quarters. Interchangeable attachments for magnet, clamshell, grapple, or hook work. Capacities 12½ to 110 tons.



RUBBER-MOUNTED cranes travel and work anywhere around your plant . . . inside-outside of buildings . . . make cross-town trips to warehouses, docks, or other plant sites. Available in truck-mounted, or self-propelled (one-man-operated) types. Capacities to 60 tons.

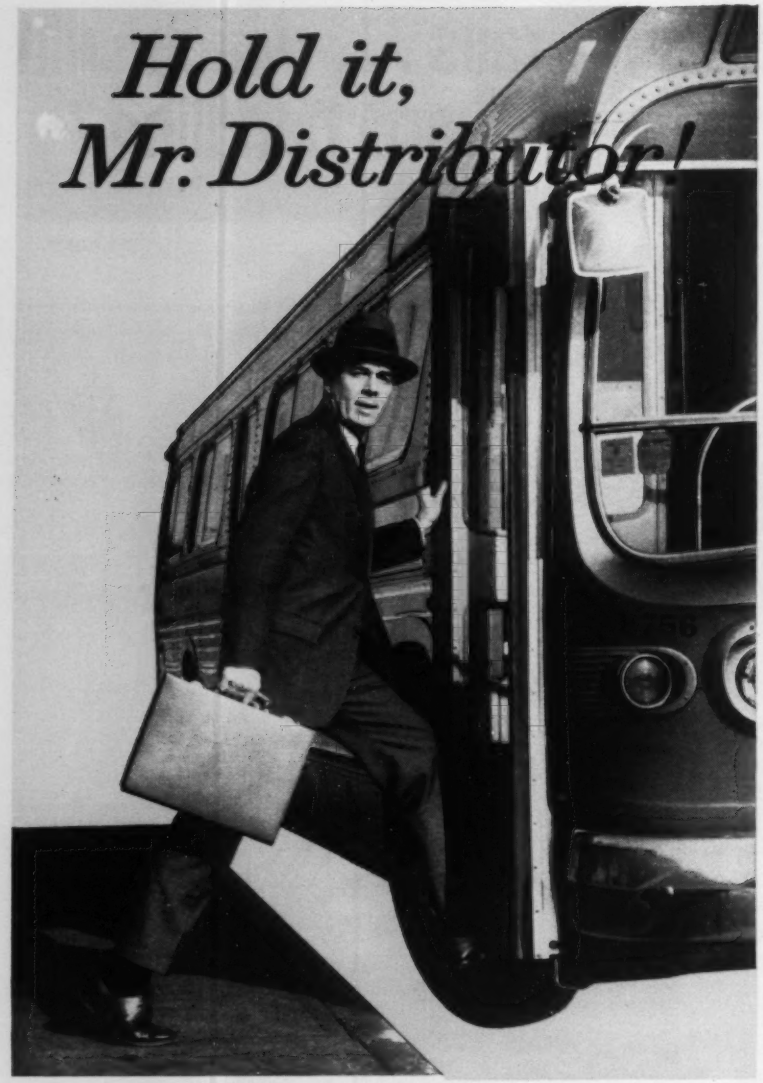


LOCOMOTIVE cranes offer the advantage of doubling on both materials-handling and car spotting duty. Owner cost records show that AMERICAN DiesELectric® locomotive cranes *can write off their cost completely in 5 years.* Capacities to 80 tons and up. Diesel or DiesELectric power.

ARE YOU SURE your plant is using the lowest-cost method of yard materials-handling? Ask us! As the *only* manufacturer offering a complete choice of crawler, rubber-mounted, and locomotive cranes, we are in a unique position to help analyze your needs . . . and make unbiased recommendations. CC-712

AMERICAN

AMERICAN HOIST and DERRICK COMPANY
ST. PAUL 7, MINNESOTA

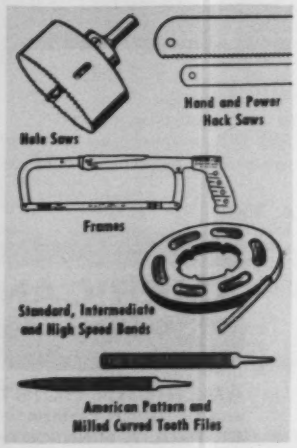


...I've got a metal cutting problem. That's all you've got to say... and your nearby Victor Saw distributor gets busy finding the answer. He's well posted on advances in metal cutting, and all Victor's engineering facilities and personnel are at his beck and call. He carries the full Victor line of hand and power hack saw blades, band saw blades, hole saws and files. He knows which is best for your particular job and can deliver it quickly.

Get the habit of calling him in! You can count on him for sound advice... and on the solid quality of the Victor products he sells.

Free Metal Cutting Guidebook and Wall Chart tell about the different kinds of blades and how to use them. Just ask your Victor distributor, or write to Victor direct.

4438


Hand and Power Hack Saws
Hole Saws
Frames
Standard, Intermediate and High Speed Bands
American Pattern and Milled Curved Tooth Files

STOCK AND SELL VICTOR

VICTOR

VICTOR SAW WORKS, INC.
Middletown, N. Y.
Warehouses in Chicago, Los Angeles & Portland, Ore.

Foundry Products Div. and a Steel Mill Products Div.

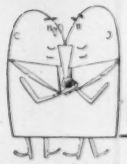
Larsen Industries Inc., Murray, Utah, changed its name to United Technical Industries Inc. A new divisional organization includes: Beryllium Div., Rare Earth Products Div., Aerospace Products Div., Fluorspar Div., and Petroleum Div.

7-Mile Tunnel Planned

A 7 mile tunnel will be constructed at Casapalca, Peru, by Cerro de Pasco Corp., subsidiary of Cerro Corp., N. Y. The $8.4 million drainage and ventilation project will permit mining of extensive quantities of silver, lead, and zinc as much as 2400 ft lower than the present limit imposed by underground flooding.

Repair Div. Organized

Crane Co., Chicago, has formed Valve Servicing & Repair Div. A repair facility is in operation at Chicago, and plants are scheduled to open soon in Houston and Los Angeles.



CONSOLIDATIONS

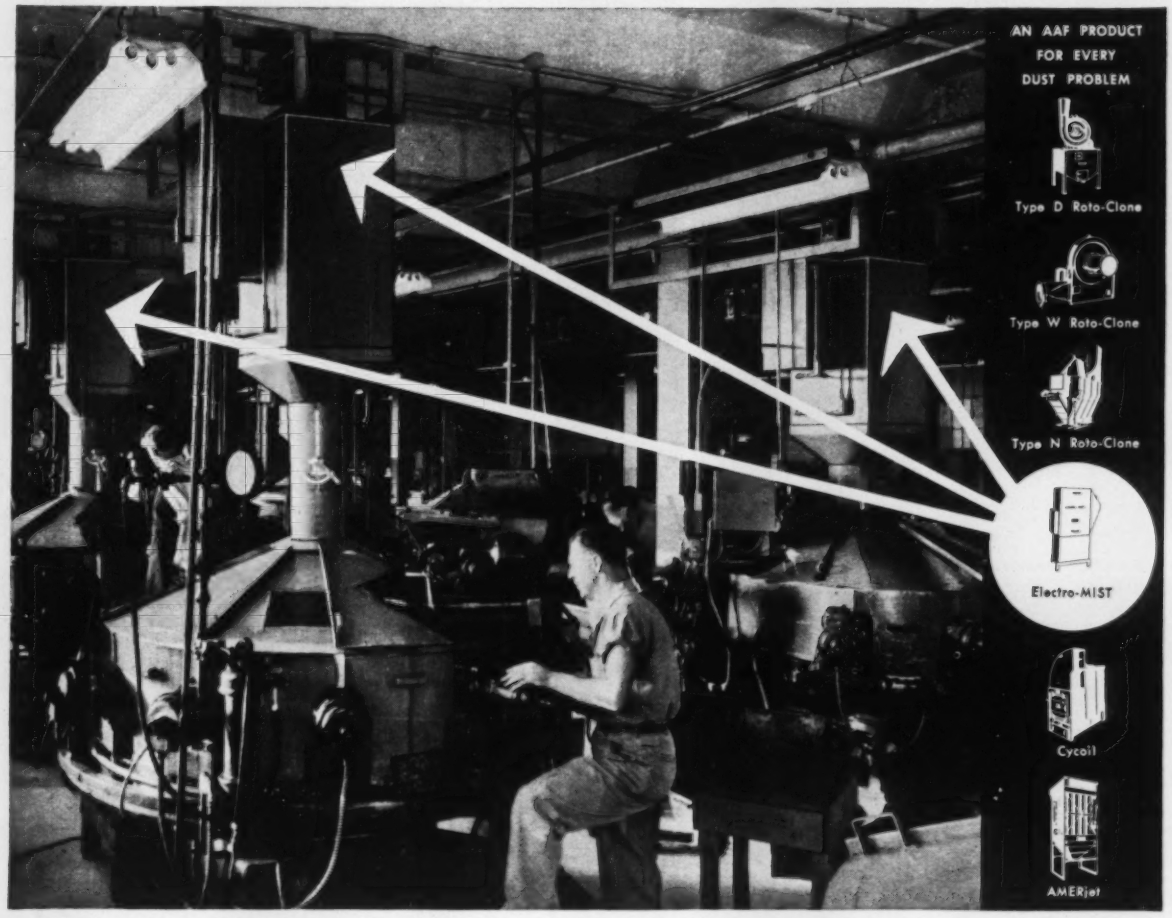
Bowman Products Co., St. Paul, acquired **Pyramid Nut & Bolt Corp.**, Newark, N. J. The special fastener manufacturer will be operated as a wholly owned subsidiary of Bowman.

Scott Aviation Corp., Lancaster, N. Y., purchased **Ward Tool & Machine Co. Inc.**, Alden, N. Y., manufacturer of hydraulic mechanisms through a new subsidiary, **Ward Hydronics Inc.** Officers of the new firm are: E. M. Scott, president; R. R. Beattie, executive vice president; and R. D. Pollock, vice president and treasurer.

Ohio Forge & Machine Corp., Cleveland, acquired **Precision Cold Forged Products Co.**, Detroit.

Assets of **Conair Inc.**, Glendale, Calif., were acquired by Richard B. Hubbard and Stanley O. Ruzicka. The company manufactures hydraulic system components, metering

WET MACHINING



Eliminate oil mists with AAF's new increased-capacity *Electro*·MIST precipitators

● Wet machining need not be a greasy, oil-spattering, fire-hazardous process. AAF Electro·MIST electrostatic precipitators trap and collect oil mists, smoke and fumes right at their source.

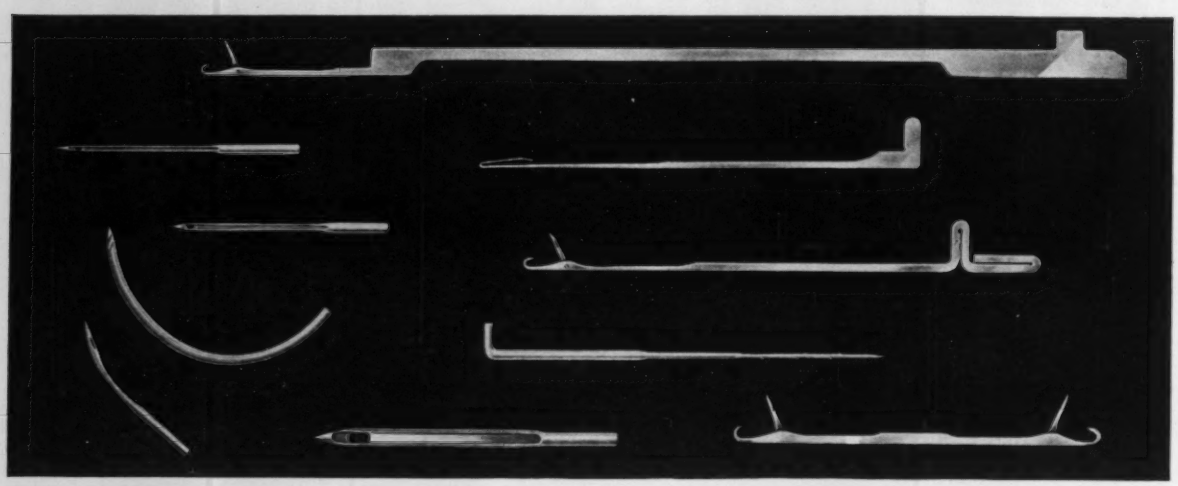
AAF's new Electro·MIST is a combined exhauster and electronic collector, completely self-contained and self-cleaning in operation. Now designed in sizes from 1,000 to 3,000 cfm, these new models assure cleaner workroom air, regardless of the type wet machining operation. And three Electro·MIST precipitators, installed side by side, require only one motor and one power pack.

AAF's complete line of dust control equipment was application-developed, now challenges *any* metalworking dust problem. If your problem is wet machining oil mist, call your local AAF representative, or write for Electro·MIST Bulletin 251. Address Mr. Robert Moore, American Air Filter Company, Inc., 443 Central Avenue, Louisville, Kentucky.

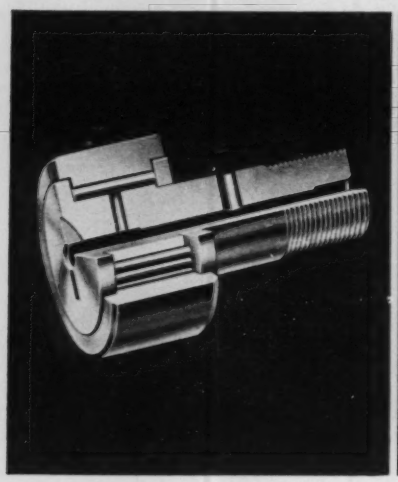
AAF **American Air Filter**

BETTER AIR IS OUR BUSINESS

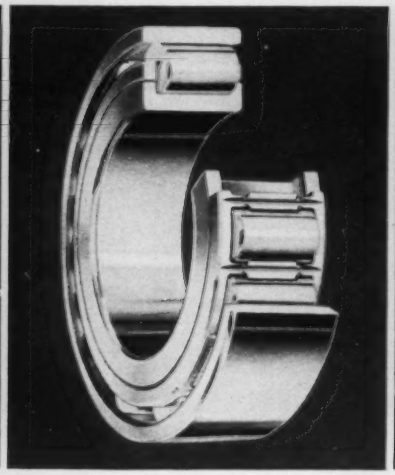
YES, TORRINGTON MEETS EVERY NEED FOR MACHINE NEEDLES: KNITTING, SEWING, TUFTING, FELTING...



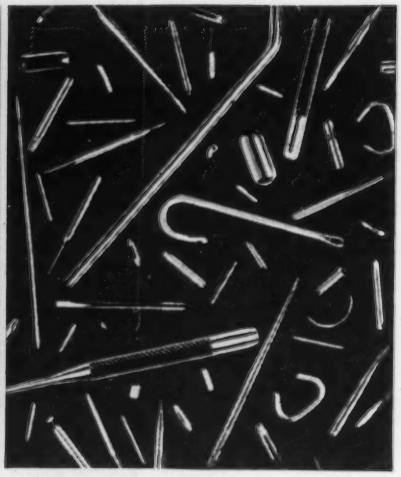
BUT THIS, TOO, IS TORRINGTON...



Outstanding maker of needle roller cam followers built to withstand heavy loads in aircraft, textile machinery and other equipment.



Precision manufacturer of radial roller bearings used for such heavy duty applications as steel rolling mill and oil field equipment.



Foremost producer of small precision metal parts, manufactured by the millions for use in countless industrial and consumer products.

In these and many other fields throughout the world Torrington is contributing to

PROGRESS THROUGH PRECISION

THE TORRINGTON COMPANY

Torrington, Connecticut

Serving industry from plants located in the United States, Canada, England, Germany and Italy

valves for fluids, and components for microwave applications. It also performs various services for the aerospace industry.

Alloys Unlimited Inc., Long Island City, N. Y., acquired **Veritron West,** North Hollywood, Calif., manufacturer of glass-to-metal seals used in semiconductor devices, relays, transducers, and other electronic components.

NEW OFFICES

Riverside-Alloy Metal Div., H. K. Porter Company Inc., opened a sales office at 3537 Epley Rd., Cincinnati, Ohio. Joseph Whinney is in charge. The Chicago office was moved to 2567 Greenleaf Ave., Elk Grove, Ill.

H-P-M Div., Koehring Co., Mt. Gilead, Ohio, established a sales and service office at 708 Commerce Bldg., Worcester, Mass. F. D. Barrick is in charge of sales; Robert Wirick, service.

M. W. Kellogg Co., New York, opened a sales office at 200 S. Michigan Ave., Chicago, Ill. Midwest regional manager there is R. G. Thompson.

Harvey Aluminum now has an office at 5805 Excelsior, Minneapolis, Minn. G. J. Johnson is manager.

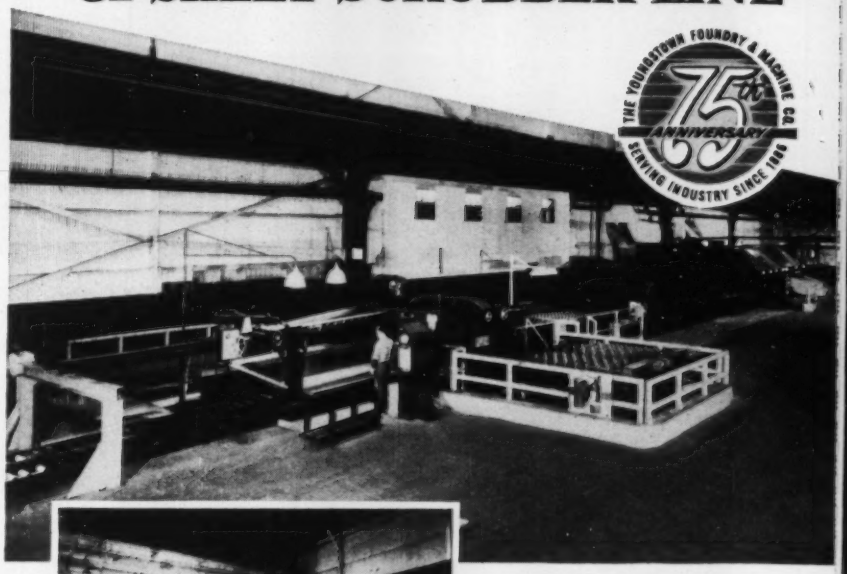
ASSOCIATIONS

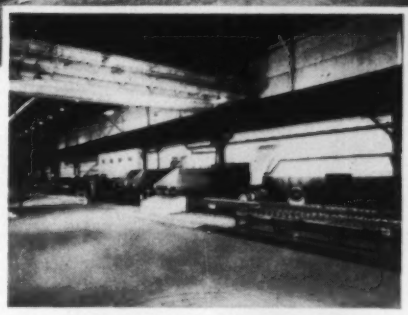
Dr. J. B. Wiesner, President Kennedy's special assistant for science and technology, will receive the **Electronic Industries Association** 1961 Medal of Honor for "distinguished service contributing to the advancement of the electronics industry."

Metal Dealers Div., National Association of **Secondary Material Industries Inc.,** New York, elected J. R. Sternberg, Consolidated Hide & Metal Co., Asheville, N. C., president. Two officers were re-elected: Charles Rasher, McMahon Iron & Metal Co., Bronx, N. Y., treasurer; and Si Wakesberg, NASMI, secretary. Ben Kaufman, H. Kramer &

(*Please turn to Page* 78)

"YOUNGSTOWN"
81" SHEET SCRUBBER LINE





Entry end of "Youngstown" 81" sheet scrubber line at United States Steel's Irvin Works.

. . . built for
United States Steel's Irvin Works
Dravosburg, Pa.

This ultra modern 500 fpm scrubber line is designed to increase tonnage per turn, in cleaning steel sheets up to 76" wide and .250" thick.

The line was furnished complete including unloading conveyor, skew conveyor, acid spray unit, water spray unit, alkali spray unit, hydro scrubber unit, sheet dryer, cooling system and conveyors, and all auxiliary equipment including acid proportioning, dry met, fume exhaust system, electric motors and controls, air conditioned electrical control station, installation, erection, and foundation engineering.

You can rely on "Youngstown's" 75 years of scrubbing, pickling and cleaning know-how. Your inquiries are invited whether you require a complete turnkey installation or any auxiliary component.

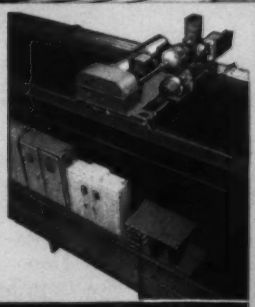
The Youngstown Foundry & Machine Co.

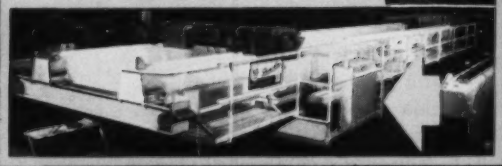
Youngstown 1, Ohio

38

You can

40-ton crane in midwestern heavy-metal processing plant, recently equipped with EC&M STATA Hoist Control





10-ton cranes on erection floors of Whiting Corporation *(right)* and Shaw-Box *(below)* with EC&M STATA Hoist Controllers, mounted and wired

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

spot 40 TONS—

—OR CRACK A WALNUT—WITH

EC&M STATA CONTROL

Now it can be done with precision by AC! EC&M STATA Hoist Control gives the finest electrically controlled speed regulation ever attained. Regardless of crane load, the operator can release the brake and hold any load stationary—a big advantage when landing loads, hooking-on, or unhooking. Also, the operator has infinite operating speeds between standstill and full load motor speed for both hoisting and lowering. The EC&M STATA Hoist Control provides these important benefits:

Fast response lets an operator change directions quickly, permits the hook to respond rapidly to master switch movements

No mechanical or electrical load brakes to mount or maintain

Fewer trolley (collector) bars than with any other stepless system

Fail-safe feedback circuitry removes power and sets brake if an open circuit occurs

Overhoisting protection with standard power-type (Youngstown) limit stop—no additional equipment to lower down after limit switch trips

Simplified maintenance—the static components, enclosed in sub-assemblies, are more reliable, more easily understood and provide convenient inspection or test points

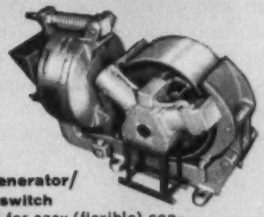
Float control, actuated by a push button in the master switch handle, permits standstill with the brake released; also provides creeping speeds, up or down

Front-connected control panels facilitate mounting, permit rapid testing or inspection. Full motor protection built into each panel

When buying cranes or revamping existing installations, investigate EC&M STATA Control

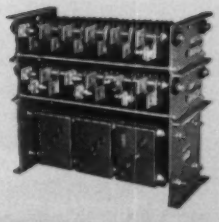
Write **FOR COMPLETE FACTS** • *Ask for Bulletin 6401—Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio*

Compact, Coordinated Units for Easy Mounting on Crane Trolleys



Tach-generator/ Speed-switch unitized for easy (flexible) connection to wheel of EC&M WB hoist brake

Power-type (EC&M Youngstown) Safety Limit Stop operates in normal manner to prevent overhoisting. Disconnects power, sets brake—resets automatically when master switch is moved to lower



Resistor-reactor assembly connects to motor slip rings... its fixed values eliminate secondary trolley collectors

wherever electricity is distributed and controlled

5350

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MISSILE CLEANING TOWERS AT DOUGLAS AIRCRAFT'S SANTA MONICA PLANT.

FULL-FLEDGED PARTNERS IN AMERICA'S VITAL AEROSPACE PROGRAM

Detrex know-how and superbly designed products are being supplied to the Aerospace Industry in constantly increasing amounts.

Practically every major industry in the country has benefited from the marked superiority of Detrex chemicals, equipment and service.

Here is a combination of facilities and services unequalled in its field.

There is only one Detrex—a single, quality source for all your metal cleaning requirements.

Write today for detailed information on our products or services.

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Alkali and Emulsion Cleaners
Rust-Proofing Materials
Vapor Generators
Phosphate Coating Compounds
Paintbond Compounds
Extrusion and Drawing Compounds
Spray Booth Compounds
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DETREX CHEMICAL INDUSTRIES, INC.
BOX 501, DEPT. S-461, DETROIT 32, MICHIGAN

(*Concluded from Page 75*)

Co., Philadelphia, was elected president of the Secondary Metal Institute of NASMI.

Galen Andrews, Barnes Drill Co., Rockford, Ill., has been elected vice president of the **National Association of Purchasing Agents**, New York.

National Association of Secondary Material Industries Inc., New York, elected these officers: President, L. E. Selig, J. Solotken & Co. Inc., Indianapolis; and vice presidents, W. H. Daley, Independent Paper Stock Co., San Francisco; Theodore Gruen, International Minerals & Metals Corp., New York; Charles Rubenstein, Central Metal Co., Plainville, Conn.; and Bernard Schapiro, S. Schapiro & Sons Inc., Baltimore.

NEW ADDRESSES

Allegheny Ludlum Steel Corp. moved its St. Louis district office to 10720 Baur Blvd., St. Louis 32, Mo.

NEW PLANTS

Mor-Flo Heater Co., Cleveland, has started construction of a plant, office, and warehouse at 18450 S. Miles Ave., Warrensville Heights, Ohio. The $575,000 plant will be completed by September 1961.

The new plant being built for **Atlas Powder Co.**, Wilmington, Del., will produce 50 million lb of glycerin and related polyols yearly. Production will employ the new Atlas process which involves both hydrogenation and hydrogenolysis of carbohydrate raw materials. The $17 million facility is scheduled for completion during the second quarter of 1962.

A $30 million automobile assembly plant will be constructed for **Chevrolet and Fisher Body Divs.** of General Motors Corp. at Fremont, Calif., in time to permit assembly of 1963 autos. Occupying a 300 acre site, the single building will provide 2 million ft of floor space.

STEELMAKING AT JESSOP

Listen...

5...4...3...2...1...0...Lift Off!

The countdown is on.

Scientists and skilled technicians scan their instruments, alert to the least sign of malfunction.

Liquid oxygen has been piped into the fuel chamber of the gleaming Atlas ICBM poised on the launching pad. Other last-minute preparations are completed.

Tension mounts. It won't be long. Listen . . .

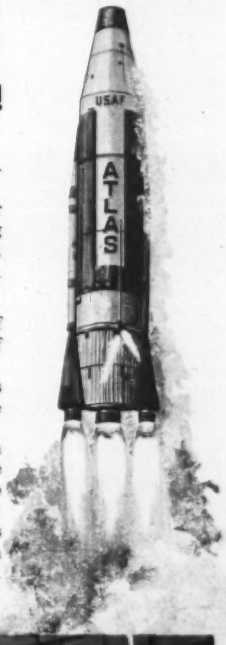
5...4...3...2...1...0...*Lift Off!*

The missile comes to life in a swirling cloud of vapor, exhaust and flame. The engine—capable of 360,000 pounds of thrust—roars thunderously.

Airborne now, the Atlas gathers speed and soars majestically on its predetermined course down the Atlantic range—a successful launching.

Jessop Steel Company makes several alloys used in the Atlas—steels forged and machined into precise but rugged mechanisms. And you will find Jessop steel in the launching pad "plumbing" too.

Swepco Tube Corporation of Clifton, N. J., makes piping for LOX systems that fuel the Atlas with liquid oxygen at temperatures of –300° F. to –320° F. *That's* punishment for any metal.



But Swepco's austenitic chromium nickel Rock-Forged pipe can take it. Ductility—to avoid fracture by reason of brittleness—is an all-important factor in this application.

With a value of about 38 foot pounds by Charpy Impact Test, the piping supplied by Swepco handles the job with ease—with an added measure of safety against costly breakdown.

Swepco buys steel from Jessop for rock-forging. Why? Because through controlled chemistry and certain production techniques, Jessop and Swepco developed a steel second to none in workability in the cold forging process.

In making steel like this, experience counts . . . and Jessop has it. Call any of Jessop's 23 sales offices in North America and let us prove it to you.

Plants and Service Centers:
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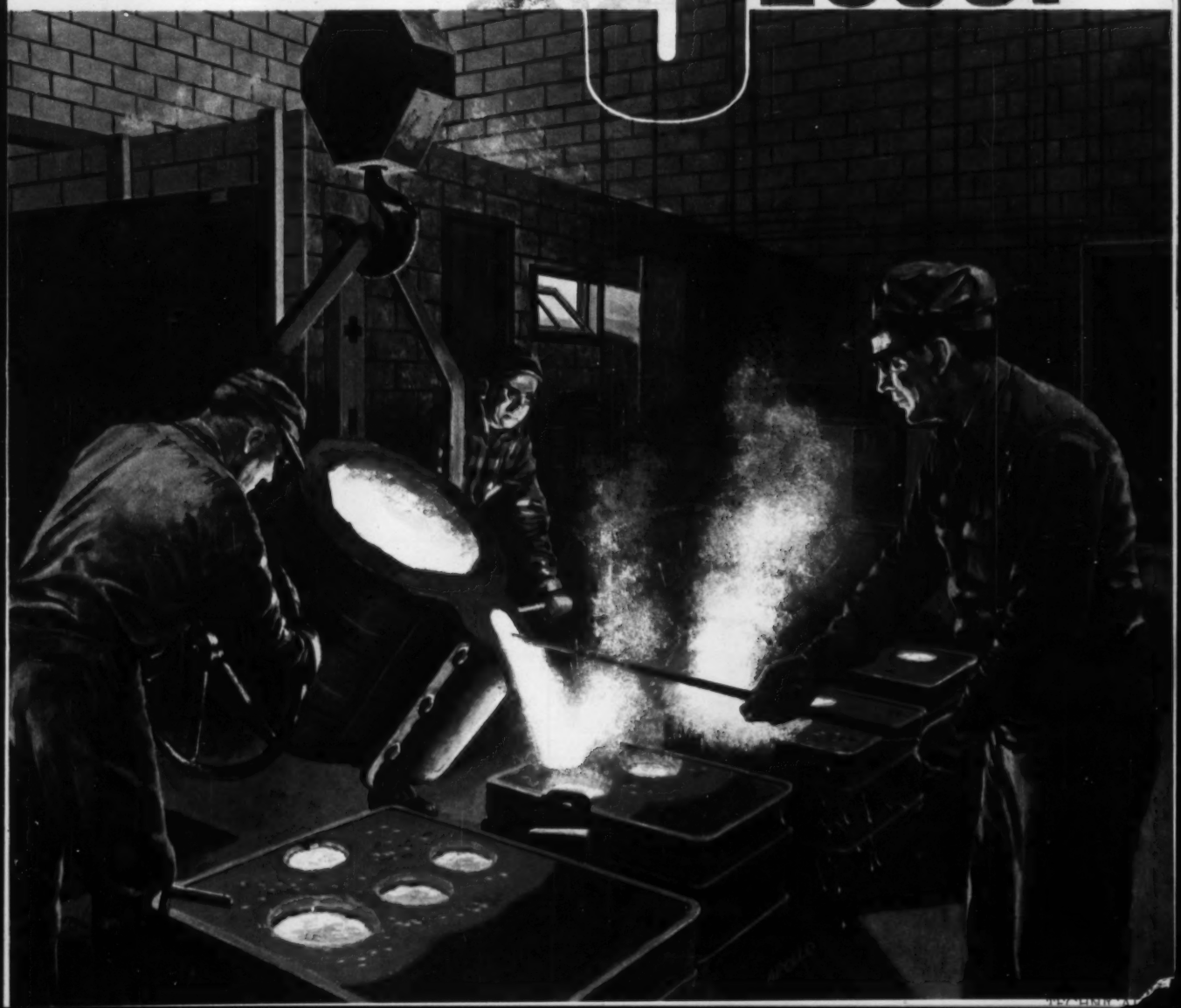
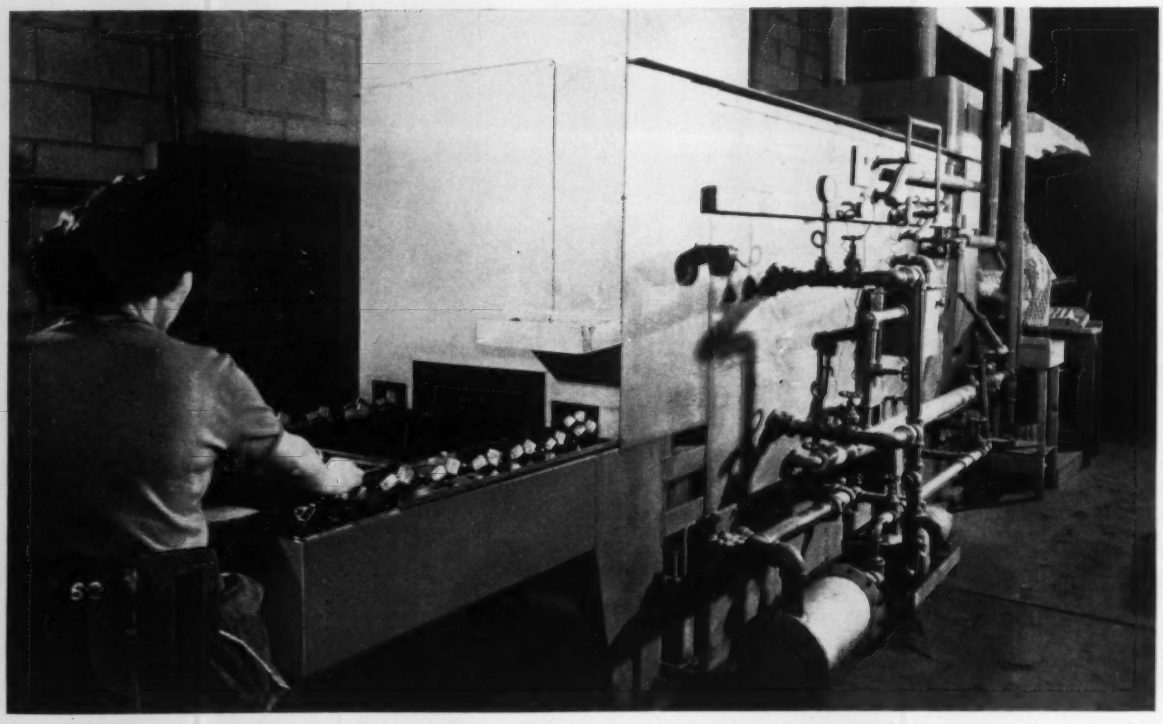
JESSOP





HOW ZIPPO DEGREASES 100,000 PARTS BEFORE CLEANOUT

Zippo Manufacturing Company, Bradford, Pa., is meticulous about degreasing parts and cases used in their lighters. The company does as careful a cleaning job as watchmakers or manufacturers of aircraft instruments.

With all their attention to detail, they still manage to degrease 100,000 parts before cleanout with Nialk® TRICHLORETHYLENE. The special stabilizer contains *psp*—permanent staying power. This permits them to process a large volume of parts without endangering their quality. *Psp* maintains the stabilizer at maximum efficiency between cleanouts.

The stabilizer also prevents gummy substances from forming, substances which might coat the heating elements in the degreaser units and reduce efficiency of the operation. The vapor and bath stay clean. Parts never become tarnished.

When baths are cleaned out, Zippo gets full recovery of the solvent, and it is fully stabilized so they never have the cost and trouble of adding fresh stabilizer to maintain bath strength.

Zippo likes the several different degreasing jobs that Nialk TRICHLOR does. As many as five different metals might be degreased in a day—brass, stainless steel, die-cast zinc, copper and gold.

Even considering all the use Zippo gets from each bath, they have never had to sacrifice quality. There has never been a need to titrate or run any other type of test.

Nialk TRICHLOR can bring you the same benefits and cost savings. Hooker technical experts can help you to set up your degreasing operations, then check regularly to make sure your operation remains trouble-free. Zippo obtains Nialk TRICHLOR through Ken C. Merrill Co.

See *your* Hooker Chemical distributor. He will be glad to help you with your problems and questions. Or write us direct. Our years of experience are yours for the asking.

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Sales offices: Buffalo, Chicago, Detroit, Los Angeles, New York, Niagara Falls, Philadelphia, Tacoma, Worcester, Mass. *In Canada:* Hooker Chemicals Limited, North Vancouver, B.C.

REFRACTORY HONEYCOMBS— Engineers at Northrop Aircraft Corp., Hawthorne, Calif., are evaluating honeycomb structures (or other composites) made from refractory metals. Current production target: 1962.

LIGHTENS CONSTRUCTION— A new 16 mm sound movie projector is made 8½ lb lighter (20 per cent) through use of diecast magnesium, glass fiber parts, and miniaturized electrical components, claims Bell & Howell Co., Chicago.

HIGH STRENGTH STEEL— An 18 per cent nickel alloy steel (developed by International Nickel Co. at its Bayonne, N. J., laboratory) can achieve a yield strength in excess of 250,000 psi while maintaining a nil ductility temperature below −80° F. Tensile strength exceeds 400,000 psi measured with a notch radius of 0.0005 in. The steel has a nominal composition of 18 per cent nickel, 7 per cent cobalt, 5 per cent molybdenum, and less than 0.5 per cent titanium, with a maximum of 0.05 per cent carbon.

LATEST THERMOELECTRIC COMPOUND— A combination of cerium, samarium, and sulfur makes a ceramiclike material that will work in solid-state power generators at temperatures up to 2000° F, states Westinghouse Electric Corp., Pittsburgh. It is said to mark the entry of rare earth materials into the thermoelectrics field.

MORE ALUMINUM TRANSPORTS— River barges 100 ft long, 50 ft wide, and 11 ft deep that weigh 100 tons are being built to carry 2.8 million gallons of liquids, states Reynolds Metals Co., Richmond, Va. The vessels are said to have 20 per cent more capacity than previous models of the same size and draft.

FASTER URETHANE PROCESSING— A resin, called Texin by Mobay Chemical Co., Pittsburgh, skirts the usual mixing problems and enables users to utilize injection and transfer molding or extrusion processes. The manufacturer says that it cuts processing time from 20 or 30 minutes down to 20 or 30 seconds and that it works in existing molds and equipment.

LEAD ALLOYS— Improvements in the tensile strength, creep, structural strength, and temperature range of lead alloys are some of the results of a direct conversion technique reported by Micronized Metals Inc., Long Island City, N. Y., the developer.

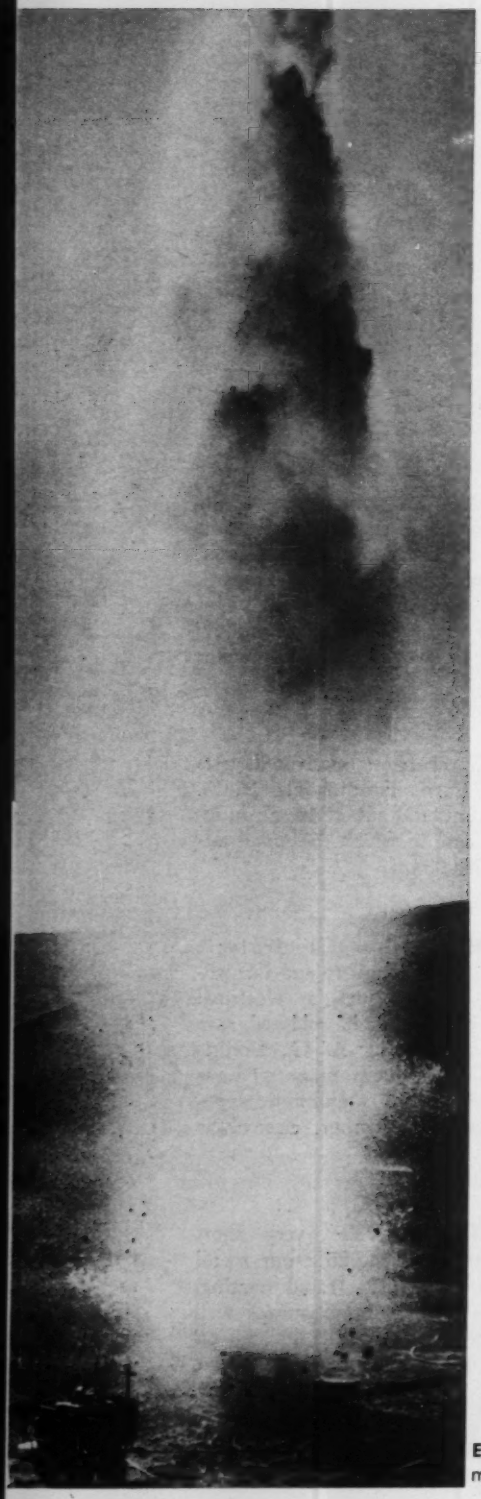
STEP TO CHEAPER ATOMIC POWER— Cheaper manufacturing costs, greater output, and longer core life potential are advantages attributed to a fabricating technique developed by Babcock & Wilcox Co., New York, for nuclear fuel elements. The fuel powder is vibrated into hollow rods which are forged or swaged to final diameter and density.

ROCKET GLUE— Government motivated tests at Republic Aviation Corp., Farmingdale, N. Y., have shown that conventional adhesives can function in a solid rocket case in which the metal adherent is stressed to 250,000 psi.

ENDS SILVER TARNISHING— Electrolytic treatment of silver has been found to end tarnishing problems in applications such as electrical contacts and surfaces intended to be soldered, says Heinz W. Dettner of Schering A. G., Berlin-Wansee, Germany. Two different processes have been found practical. One uses cataphoretic deposition of an oxide layer; the other, electrolytic chromating.

QUICK METAL TESTING— VST (very short time) testing equipment for checking out metal specimens is able to run tensile, rapid heating, creep, and relaxation tests at temperatures well above 2000°F. Stresses go as high as 400,000 psi in a setup made by Battelle Memorial Institute, Columbus, Ohio.

High Energy Forming to Gain Popularity



EXPLOSIVES form large parts of tough metals to close tolerances

Processes show potential in production of basic rods, bars, or extrusions; previously, they were applied only in making finished or semifinished parts

• BROADER USE of high energy rate forming methods was predicted last week at a meeting of the American Society of Tool & Manufacturing Engineers (ASTME) in Philadelphia.

The methods show promise in the production of basic extrusions, rods, or bars, say H. J. Wagner and A. M. Sabroff, Light Metals Div., Battelle Memorial Institute, Columbus, Ohio. So far, such applications have been confined to some of the refractory metals.

The more familiar applications involve the production of finished or semifinished parts from sheets, bars, or rods. The materials are made by conventional processing methods.

The definition of the method is also broadening out. "High energy" sources include explosives, expanding gases, and the direct conversion of electrical energy to its mechanical equivalent.

Explosive Forming, Compacting

• The popularity of high explosives and propellents is growing when large parts made of tough metals must be formed to close tolerances.

Experts say the scope (and potential) of explosive metalworking can be as broad as metalworking itself. To date, the methods have been employed in several metal forming operations—such as drawing and punching, tube bulging, hardening of certain austenitic manganese steels, compaction of powders, die forging, and billet cutting.

Materials formed by the explosive method include titanium alloys, steel alloys, stainless steels, aluminum alloys, and superalloys. Refractory metals are being studied under government contracts.

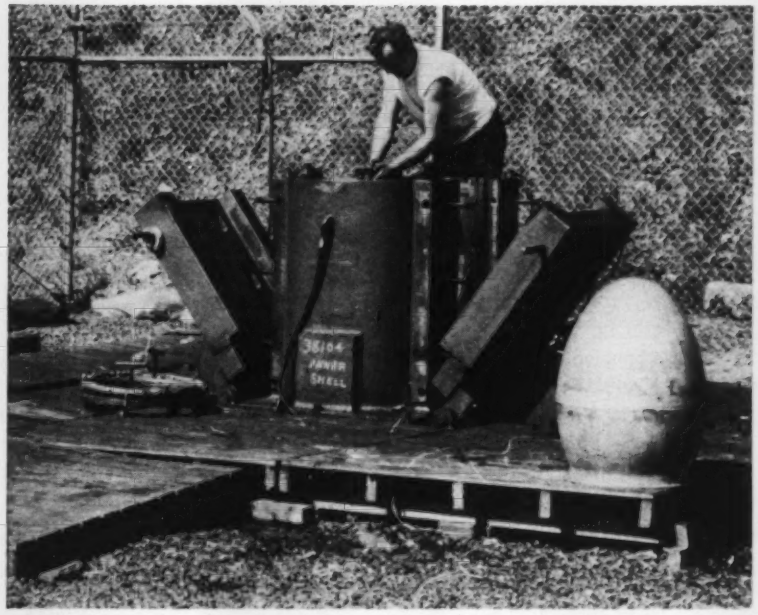
• Potential applications for explosive compacting: Formation of shapes too large or complex for practical compacting by conventional powder metallurgy techniques.

The process is particularly desirable in short production runs, where the cost of large presses or expensive, complex dies can be avoided, say S. W. Porembka and C. C. Simmons, of Battelle Memorial Institute. Disposable dies should be attractive, and explosive costs might be reduced by more general use of pack materials. Soft metals and ductile, nonmetallic materials are likely to be used for short runs. But the technique is probably too expensive for long production runs because it is less adaptable to repetitive operation than conventional processes.

Explosive compacting is also promising in the processing of metal powders that are extremely difficult to compress by conventional means. The process is said to provide the particle deformation needed for high green strengths and densities. But other methods (such as casting and fabrication of the wrought product) would have to be considered before the explosive technique was adopted.

• Final densities comparable to those obtained with pressing and sintering have been produced by explosive compaction.

Density and green strength of compacted parts depend greatly on ductility and particle size of the individual powders. Tests have been run on soft, ductile material, and on materials more difficult to compact (and on multiphase systems,



SPLIT DIES are employed for explosive forming of intricate shapes; this one is used to size aluminum warheads for missiles

such as dispersions and cermets). Those tests indicated interparticle bonding, but no tests have been made to determine the degree.

One of the soft, ductile powders (a dispersion of fused uranium dioxide in nickel) was explosively compacted at ambient temperature. Without heat treating, the structure had a measured density that was 95 per cent of theoretical value. Tungsten powder (150 micron) also formed a dense structure (94.8 per cent of theoretical density) when it was compacted at ambient temperature. No voids were noted at particle boundaries.

High density structures have also been obtained with harder materials, such as Haynes Alloy No. 25. Cold, explosive compaction provided densities that were about 95 per cent of theoretical value. Some interparticle bridging was seen, but subsequent handling didn't cause powdering. Minimum sintering would probably make for even greater density.

A single detonation at room temperature gave good density (97.5 per cent of theoretical) to a stainless steel structure. Particle bonding was so good that the structure looked much like an annealed, wrought product. In conventional powder metallurgy practice, such operations as cold pressing, sintering, coining, and resintering would have been necessary to obtain the same density. In another test, the density of explosively compacted, titanium powder was 88.4 per cent of theoretical.

• Methods used for explosive compacting of powders depend on the final size and geometry desired and on properties of the metal powder.

Explosives are available in several forms—bulk, sheets, cord, and liquid. And powder compacting systems may vary from familiar dies to pack assemblies. Compacting characteristics depend on such things as charge weight, media, buffers, and detonation patterns.

Water seems to be more satisfactory than air as a medium for the operation. Buffers can be used to alter shock wave transmission into the system and soften the explosive impact. System axiality is as important as it is in conventional powder metallurgy (proper alignment will insure the required transmission of the compacting force to the powders). It is also necessary to use the right detonation pattern to control the direction of the explosive forces.

Dies similar to those for conventional powder compacting can be used for short runs or experimental work. But they aren't recommended for long production runs. They must be rugged and must employ relatively large buffer plates to prevent upsetting of the ram. They must be tapered for easier removal of the compacted structure, especially where high densities are developed. Where the system is to be evacuated, or where water is used as a medium, suitable sealants must be employed. Double acting dies are sometimes used to develop more force.

Disposable dies — inexpensive frames to contain the powders and rams or jacketing material—are said to be better adapted to production runs. Single or double acting dies can be designed for flat plate production, using sheet explosives. But the process can be modified to handle other shapes.

Heat can be employed when densities desired are greater than those obtainable at ambient temperature. The die may be preheated prior to detonation—in firing position or in a furnace. But such preheating is difficult in a water medium. Jacketed, disposable dies are said to be more practical for hot compacting because they're lighter to handle and have less mass to be heated.

Forming with Expanding Gases

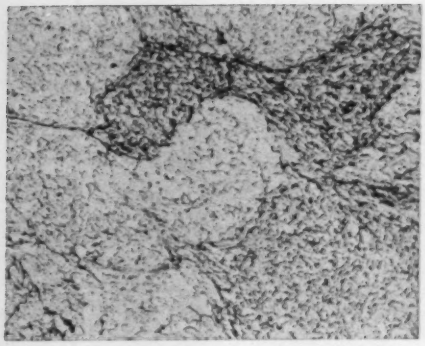
• The bulging of tubular parts and the forming of sheet metal are the most popular applications of burning propellents and exploding oxygen-hydrogen mixtures.

Metal forming with burning propellent powders is often confused with high explosive forming. But one expert makes the following differentiation:

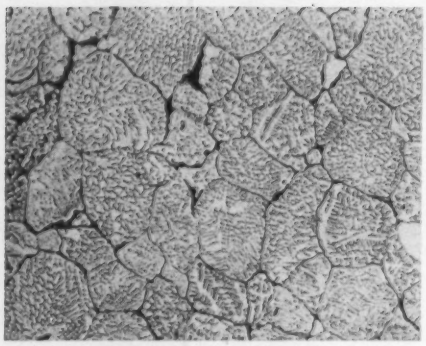
"The process using propellent powder gases in a closed die occurs in 4 to 10 milliseconds and develops pressures from a few hundred to 75,000 psi. Explosive forming in open dies takes place in 1 to 10 microseconds and develops pressures of millions of pounds per square inch."

In propellent powder forming the gases may act directly on the workpiece, which is often surrounded by the die. Or the gases may act on a piston that works through a medium (such as water or trapped rubber), forcing the work-

Solid Structure, Intricate Shape Help Counteract Shortcomings In Productivity



DEFORMATION, particle bonding occur in explosive compaction of tungsten powder



HIGH DENSITY PACKING, slight bridging are typical of hard powder compacts

piece to conform to the die.

The electrolytic gas generator is one of the newer tools for forming with expanding gases. It turns out hydrogen and oxygen in stoichiometric mixtures, by decomposing water. Ignition provides a pressure increase (about tenfold) in a few milliseconds.

• Sheet drawing has been done by expansion of liquefied gases in die assemblies. Forging and extrusion are done with suddenly released, compressed gases, in pneumatic-mechanical devices.

A metal forming method developed in Russia employs liquid nitrogen as a pressure source. The gas, fed into the die assembly, expands almost instantaneously at room temperature.

A heavy ram is accelerated to as much as 2500 inches per second with compressed nitrogen and a unique valve arrangement in Dynapak, a pneumatic-mechanical machine developed by Convair Div., San Diego, Calif., of General Dynamics Corp. The unit is said to operate at velocities up to 1800 in. per second vs. 120 to 200 for a conventional drop hammer ram.

• Current applications of the pneumatic-mechanical machine: Extrusion, forging, and compacting of metals or ceramics.

Many materials, when heated to a plastic condition and worked at a high energy rate, show hydrodynamic behavior, says J. L. McDaniel, senior manufacturing research engineer at Convair. Heat produces a flexibility (called material toughness) and reduces the critical shear stress.

Rapidly applied pressure causes reorientation of slip planes and generates additional heat. The movement causes material to flow hydrodynamically. That behavior is exploited to make extrusions, forgings, and molded parts with extremely thin webs and flanges. Other capabilities: Part forming with near zero draft angles, close dimensional tolerances, and no springback.

The machine has been used to work aluminum alloys, chromium molybdenum steels, and stainless steels. It has also been used to extrude titanium, zirconium, sintered and arc cast tungsten, and columbium alloys.

In open end extrusion, the billet or slug of bar stock is preheated by induction, or in a high temperature furnace (an inert atmosphere is advised for most materials). Then the billet is placed in a cylindrical cavity in the die, the punch is released, and semiplastic material is forced through the die opening. Forming with a closed cavity die: Material is preheated, placed in the billet cavity, and extruded through an orifice into a part cavity. The part cavity must have relief holes for escaping air and excess material.

The machine is also used for closed die forging. Materials are formed at normal forging temperatures (or higher). Only one stroke, completed in less than 10 milliseconds, is required.

• New materials and tooling methods should permit more complete exploitation of the machine.

Few tool steels are recommended for compression stresses as high as 300,000 psi. Most materials that can be heat treated to that range have poor resistance to impact and thermal stresses. If punches are loaded to their ultimate limits, no safety factor is provided. Result: Short tool life.

In many operations, punch diameter is restricted and cannot be increased in the critical area. Tool designer's dilemma: A small diameter punch must be used to provide ultrahigh unit pressures, to form complex shapes and exotic materials. But punch diameter must be kept as large as possible, to reduce unit stresses.

Resistance to heat and thermal shock aren't critical because of the short work cycle. And heat transfer from the billet to the punch is negligible.

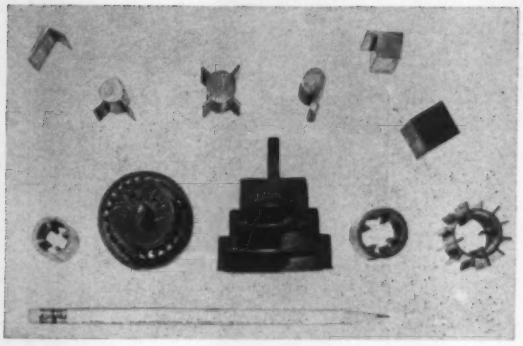
Many dies can be made stronger by increasing over-all die block dimensions. But such scaling up isn't recommended for raised sections in a die, which are subjected to high unit stresses and thermal shock. One-piece die construction is suggested to eliminate unwanted flash and minimize die failures.

Materials that can take high impact, thermal shock, and surface abrasion are needed for proper application of the machine, says Mr. McDaniel. And better atmosphere control methods must be developed.

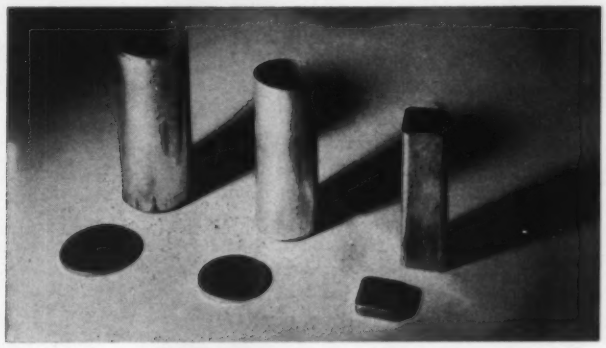
Coatings may be compounded to prevent oxidation of billets during preheating. Those coatings might also fill the need for lubricants that can stand the high temperatures and pressures of high energy rate forming.

Forming with Electrical Energy

• Sheet metal forming and bulging



FORGINGS, extrusions with thin walls and sharp radiuses are made by pneumatic-mechanical method



HIGH OUTPUT of mechanical presses is illustrated by these cans—extruded in one stroke from aluminum slugs

of tubes are likely applications for the electrohydraulic technique.

The process (which has several other names, including Hydrospark, Hy-Vo-Pak, and underwater lightning) is characterized by sudden discharge of electrical energy stored in a capacitor. That discharge and a high amplitude, short duration pulse across the spark gap cause an underwater shock wave.

Scope of electrohydraulic forming is much like that of explosive forming. The amount of power that can be employed at any one time depends largely on safety hazards. Voltage and capacitance are limited by costs and must be considered when an application is planned.

The nature of the spark gap causes forces to act radially outward from the line of spark action. If an initiating wire is used in the gap, it may be shaped to conform to the cavity of a die, for more effective energy exploitation.

• Tube swaging may be the main application for magnetic forming.

The method seems to have an advantage over other high energy methods where it is necessary to apply radial, external forces to a round workpiece. But complete evaluation of potential is premature.

Principle of the process: A rapidly rising magnetic field induces currents in the workpiece. Those currents create a magnetic field that is repelled by the primary field. Repulsion forces can be great enough to collapse or swage a tube; if the magnet coil is flat, a sheet metal workpiece can be forced into a die cavity.

Development of high intensity, transient, magnetic fields has been most interesting to scientists studying basic physical phenomena. Considerable interest has been shown in the use of a condenser discharge to produce a magnetic field. Some fields have been produced in the range of several thousand to more than a million gauss. Energy density of a magnetic field at the 0.5 megagauss level is said to be comparable to that of the most effective chemical explosive.

• Safety precautions must be part of all plans to use high energy rate methods.

Care must be exercised in the storage, transportation, and use of high explosives, says Sidney Heilveil, manager, Materials Tests Laboratory, Philadelphia, of General Electric Co. The work site and facilities must be carefully chosen. Equipment must be designed to eliminate hazards (such as radio frequency power or static electricity) that might cause accidental detonation. And the number of people in the work area must be held to a minimum.

Excessive confinement of explosives can cause dies to disintegrate. That hazard can be avoided better with pressure relief passages than with oversize dies.

In electrical shock forming, explosives are replaced by capacitors charged to high levels. Major advantage: Regulations that prohibit use of explosives in buildings don't apply; facilities are simpler to install at the plant site. But many of the hazards of explosives are said to remain, and problems associated with safe handling of electric power in large quantities are introduced. Suggested: Employment of competent physicists or electrical engineers to direct operations.

Hazards are said to be reduced in processes that depend on sudden release of liquefied or highly compressed gases.

• Technology of mechanical forming equipment is also accelerating.

Conventional metal forming equipment (and mechanical presses in particular) have inherent advantages that haven't been fully exploited, says Charles R. Bradlee, manager, cold forming sales, E. W. Bliss Co., Canton, Ohio. Their development has continued as new methods have evolved.

Direct comparison of high energy rate systems and conventional machinery is difficult, says Mr. Bradlee. But mechanical press equipment is said to excel in overcoming production difficulty (measured by the product of work size and complexity, divided by required capital). Presses are also said to offer higher productivity (measured in pieces per minute). An impact extrusion press, built recently by Bliss to make aluminum cans from aluminum blanks $\frac{1}{8}$ in. thick, can turn out 150 pieces per minute.

But mechanical and hydraulic machinery is said to have somewhat less capability where extremely large forces are required, or where multidirectional forces must be applied, as in the forming of hollow shapes. Predicted: The combination of desirable characteristics of conventional and high energy rate systems.

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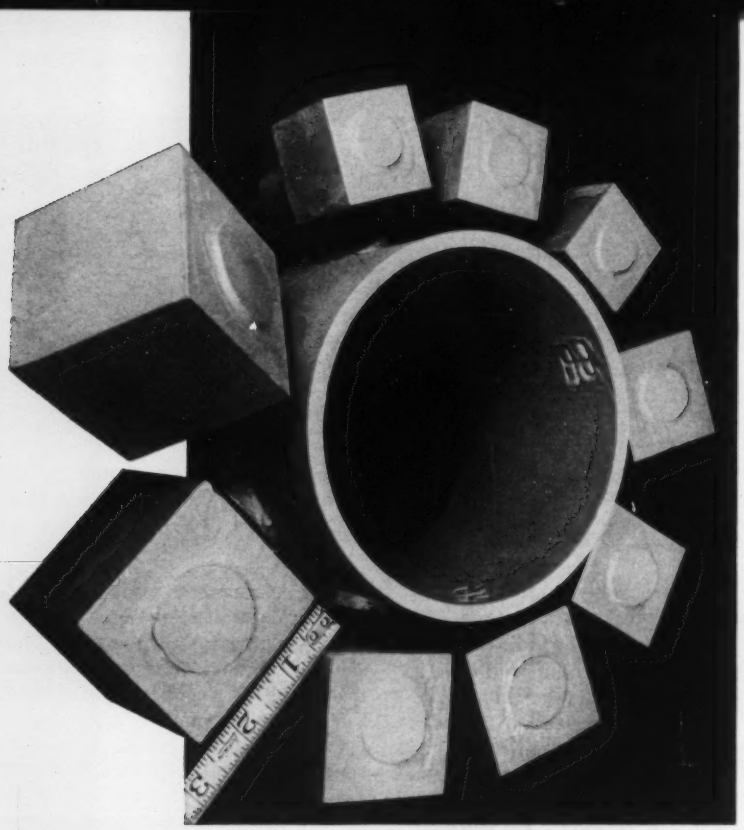
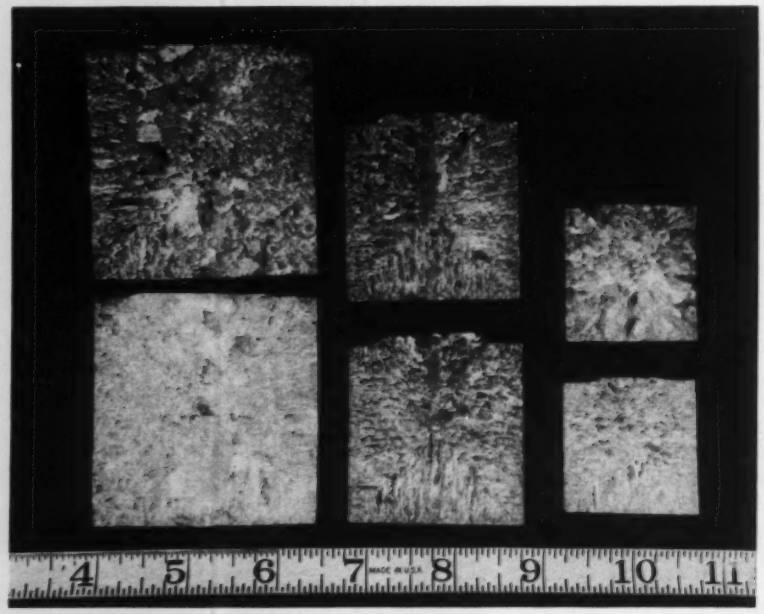


Big castings fed from tiny sprues are sound

Casting dozens of sound test patterns leads to . . .

Investment Foundry Yields Zoom with

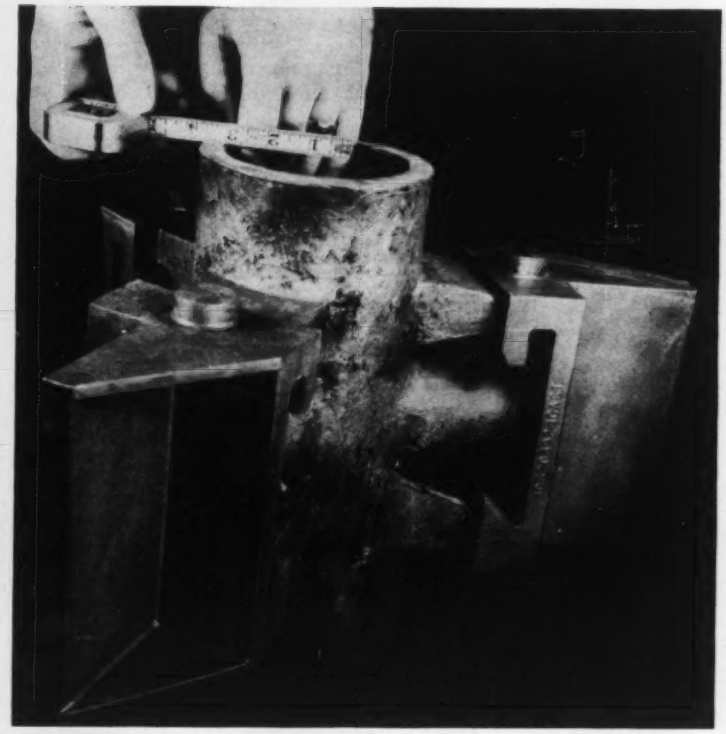


MACROETCHED CROSS-SECTION of cast stainless cubes support contention of sound castings, show evidence of most rapid cooling from outer face

• RECENT CASTING developments presage cost savings for users of precision castings. And they will cause many metallurgists and foundrymen to change their thinking on the relationships between feeding systems and casting size.

A reduced gating system in relation to the finished casting means that more of a heat of metal is converted to product. So melt time is saved; handling is made easier; more production is obtained from furnace equipment; and scrap is cut.

Test work that led to the production changes was carried out by R. L. Ashbrook, chief metallurgist at Precision Metalsmiths Inc., Cleveland. It was based on the hollow sprue process (see STEEL, Dec. 29, 1960, p. 58). Previously, the relation of gating system to cast parts had been greater than 1:1. Now, on production parts, the ratio has gone as low as 0.3:1. Experimentally,



production casting of this 15 lb part

New Feeding System

parts have been cast with a thickness ten times that of the sprue wall, although in production four times the wall thickness is the maximum so far employed by the company.

• The test program was set up to determine the limits of the hollow sprue method.

A series of cubes was hand fashioned from the wax normally employed for precision castings (photo at the top of Page 86 illustrates type of test used). The largest cube shown is 2½ in. on an edge, weighs 4½ lb, and is sound by radiographic standards—yet it was fed from a sprue averaging only ⅜ in. thick. The ingate is 1½ in. in diameter. The hollow sprue is tapered in wall thickness; some 2½ in. cubes were cast from a section of the sprue only ¼ in. thick.

The sprue used was 12 in. long, had a diameter of 5¼ in., and although the wall thickness averaged ⅜ in., it tapered down to ¼ in. The patterns were all cubes, varying from 1½ to 2½ in. on an edge. Thirty-nine such cubes were mounted on the sprue; ingate size was proportioned to the cube dimensions. Six of the large cubes were placed on the pattern setup. On the first experimental cast (using AMS 5355 A alloy, a precipitation hardening stainless), four of the large cubes were sound when checked by x-ray. On a later trial, only 3 out of 36 cubes were rejected, and all were of intermediate sizes.

The soundness of the area of the gate near the sprue is verified by macroetching and x-ray. Surprisingly, there is no tendency for dishing of the faces of the cubes.

• Results of the experimental program are being applied to production parts.

The largest part produced for a customer is shown above. Three were cast from a single hollow sprue, ½ in. in wall diameter. Made of SAE 4330, each part weighs 15 lb; measurements of the heavy section are 4½ by 2 by 1¾ in.

As test work continues, more parts are being cast with reduced ratio of feeding system to casting weight. Frank Kovatch, Precision Metalsmiths' manager of quality control, reports that warpage, shrinkage, and hot tearing have been 90 per cent corrected when converted to hollow from solid sprues.

• A number of factors are believed to contribute to the results. The basic principle appears to be the solidification of the parts from the outer portion of the assembly toward the sprue.

In preparing the ceramic shell molds, excess investment material is removed by spinning the assembled "tree" on its axis. One result is a thicker coating of refractory toward the center. In addition, the parts are usually closely spaced around the sprue, so it tends to retain its heat longer and heat must escape through the castings.

A sort of thermal wedge is created because the castings are placed radially around the sprue. That also has the effect of increasing the heat lost from the outer faces of the castings, promoting directional solidification.

The sprue area is the hottest portion. All the molten metal must enter through the sprue, thus the velocity is high, and there is maximum opportunity for this portion of the mold to be heated to the metal temperature. The sprue is the hottest portion of the mold; that fact, plus greater thickness of refractory, holds the sprue metal molten longer than would be predicted from the metal thickness alone. And the inner walls of the sprue radiate to each other, so heat loss is outward.

• The 2½ in. cube size is not the limit, the company believes. But W. F. Riski, manufacturing manager, feels it is big enough to handle any parts now in production at the plant.

He comments: "We're casting 2 to 4 times more parts per mold, saving material, and increasing production per manhour. It looks like we're moving forward in foundry practice."

Operator puts the eddy current probe in contact with a sheet to be stretched. It's hooked to the meter overhead, and meter readings tell the operator when to stop the stretching operation

Stretch Press Ages Sheet, Probe Tells How Much

• EDDY CURRENT stretch aging on a big Hufford stretch press saved $14,091 on processing 427 sheets of Armco 17-7 PH steel at North American Aviation Inc.'s Los Angeles Div.

The savings came about through elimination of rejections and re-stretch requirements.

Since the eddy current can be used for sheet acceptance, 92 per cent of acceptance tensile tests are skipped. The saving includes labor, material, and testing costs.

• A probe was developed which permits meter readings to be taken during stretching that are correlated to the as-aged condition of the sheet.

Tests at North American and at Magnaflux Corp., Chicago, showed that a relationship could be established between eddy current meter readings and the aged mechanical properties of the material.

The operator of the press chills the die or backup plate to 20° F. He then grips the sheet in the jaws of the press and puts the eddy current probe in place. Starting the press, he pulls the sheet over the cold block until the meter reads in the prescribed range (established by trial and error). At that point, he shuts off the press.

The procedure gives him finite control of the process, aimed at providing sheet properties of 5 per cent elongation, 180,000 to 220,000 psi ultimate tensile strength.

After stretching, the sheets are pierced, routed, or otherwise made into blanks—then they're formed. After forming, the parts are aged at 850° F for 1 hour.

E. D. Secker, test engineer at North American's Production Development Laboratory, says: "Since we established this control on the stretching, we have eliminated pretesting of sheets because we automatically compensate for variations in properties of the material we receive. Further, we have not had a single case in which the final part properties were outside our limits. We have had to do no rework to boost properties, and have had no scrap attributable to the stretch aging operation."

• The job used to be done by tailoring aging as sheets were processed.

Sheets formerly were aged in a two stage heat treatment. The technique, says Mr. Secker, produced considerable distortion, and often required hand rework of parts. In some cases, parts had to be scrapped.

Next, North American engineers went to stretch aging, but without the eddy current reading to guide them. They measured the properties of each heat and gage of incoming sheets, then prescribed stretching rate and extent for each sheet. After aging, measurements were taken again, and if properties were too low, restretching was ordered. If first stretching had gone too far, the sheet became scrap. Mr. Secker reports that with that technique, 27 per cent of the sheets had to be reworked—4 per cent of them were scrapped.

Now, only about 8 per cent of the sheets stretched get any further testing. In those cases, the eddy current meter reading was outside the prescribed range, but in all such cases so far, final properties have been within limits.

In a run of 390 sheets, the engineers computed their savings at $33 a sheet with the in-process meter control.

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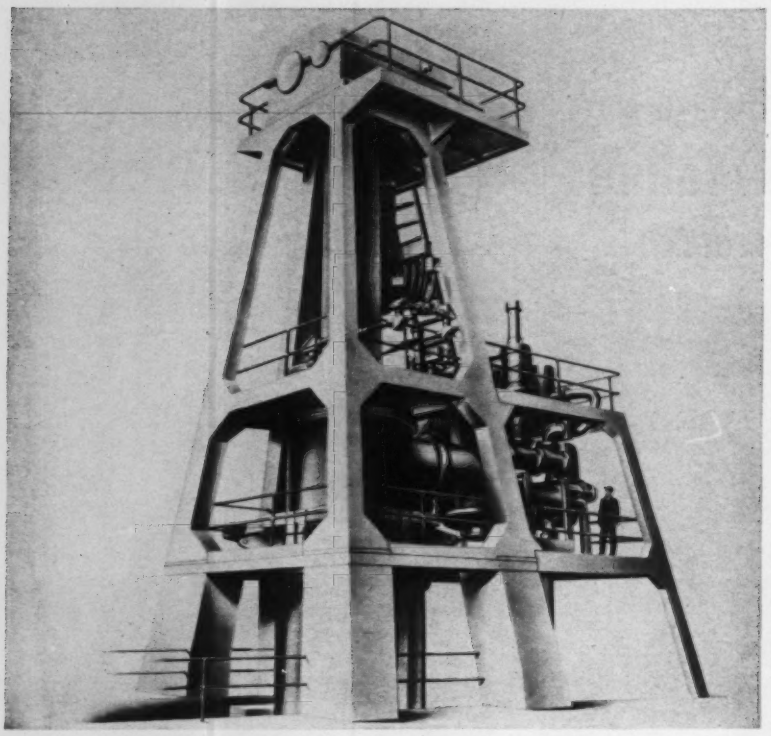

New furnace boosts vacuum remelt capacity as . . .

Specialty Steel Producer Modernizes Melting Shops

• THE PURCHASER of premium quality steels and high temperature alloys usually observes two basic rules in each application: The material must be good enough to give required performance, but costs must be kept in line. Many steel producers are building greater flexibility into their melting facilities, to supply materials specified by their customers. Example: Midvale-Heppenstall Co., Philadelphia, recently completed major modernization of its melting departments.

The company markets heavy forgings, ingots, and billets in a wide range of ferrous metals—from air melt, carbon steels to consumable electrode, vacuum arc melted alloys.

• The company is placing greater emphasis on vacuum remelting.

The name Midvac has been given to the company's version of consumable electrode, vacuum arc remelting—a process that is said to produce cleaner metal than any other known method. Metallurgists at Midvale-Heppenstall attribute that cleanness to the breakdown of less stable compounds at an arc temperature of 8500° F and a 5 to 50 micron vacuum. (For superalloys, a 5 to 10 micron vacuum is maintained.)

Another factor: Levitation of the more stable and lighter compounds, such as those containing titanium. That effect eliminates stringer material normally found in air melted steels, improving hot and cold workability.

The process is said to minimize oxygen and hydrogen content, to improve chemical homogeneity, and to reduce segregation of inclusions in the ingot. And controlled solidification is said to improve ingot soundness, eliminating pipes and center porosity. It makes for more refined cast structures (which require less reduction in forging) and better mechanical properties.

• The availability of larger ingots of consumable electrode, vacuum melted steels makes for broader product applications.

A new furnace put into operation recently boosts the company's annual capacity in vacuum arc steels to 16,000 tons. The unit was installed by the Rochester (N. Y.) Div., Consolidated Electrodynamics Corp., a subsidiary of Bell & Howell Co. It will be operated to cast ingots 25 to 40 in. in diameter, weighing up to 25 tons. It is designed to cast ingots up to 60 in. in diameter and weighing 40 tons.

The company expects demand for steels of greater purity and reliability to grow in nonmilitary fields. Larger ingots from the new furnaces may be used for larger marine, utility, and industrial steam turbine shafts, bucket wheels, marine and land gas turbine parts, and for larger, steel mill work rolls, die blocks, hammer rings, or piston rods. Larger rocket motor parts for missiles and larger forgings for nuclear reactors will also be possible.

• Better performance in many application areas is increasing demand for metals from the company's expanded vacuum melting facilities.

The new furnace greatly increases over-all output of the vacuum melt shop, where two other consumable electrode units have been in use for about five years. The older furnaces, installed by Zak Machine Works, Troy, N. Y., produce ingots 12 to 21½ in. in diameter, weighing up to 9300 lb.

Superalloys and high strength

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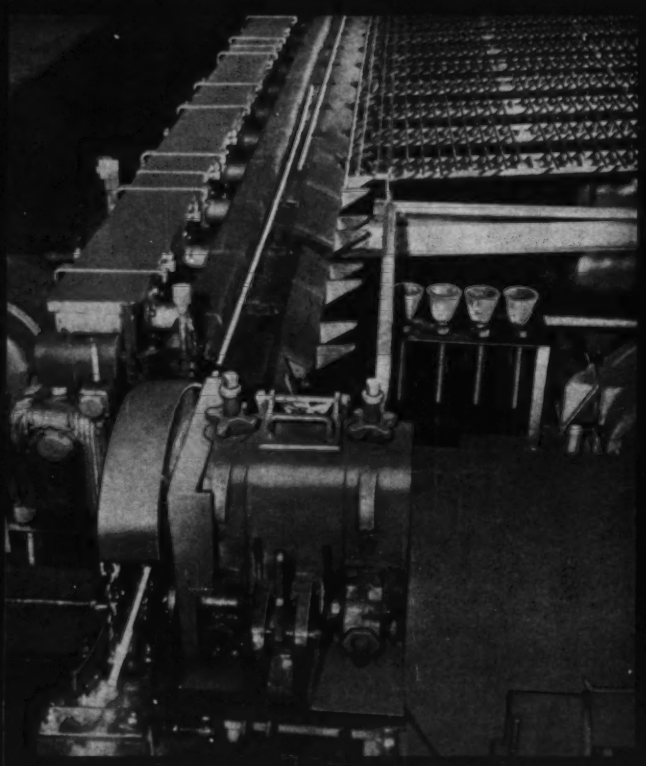

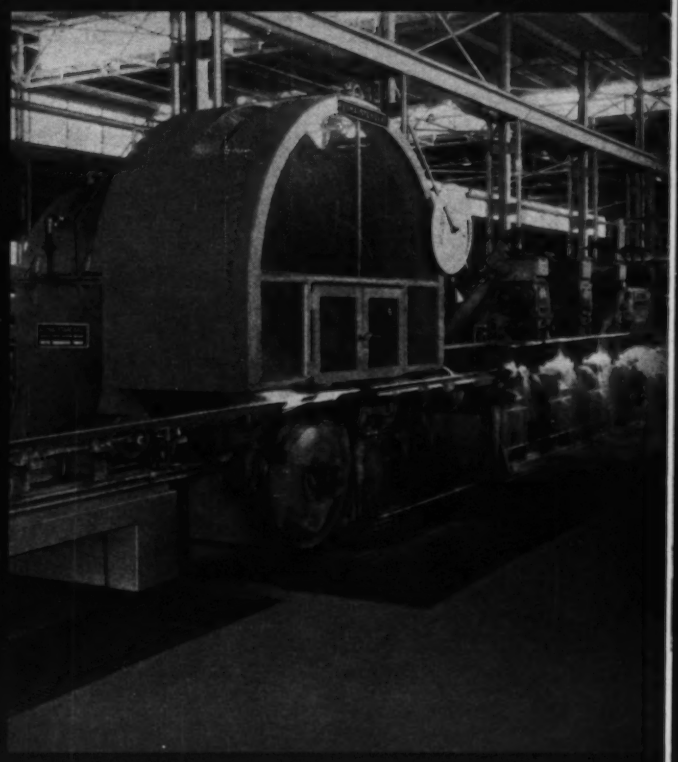

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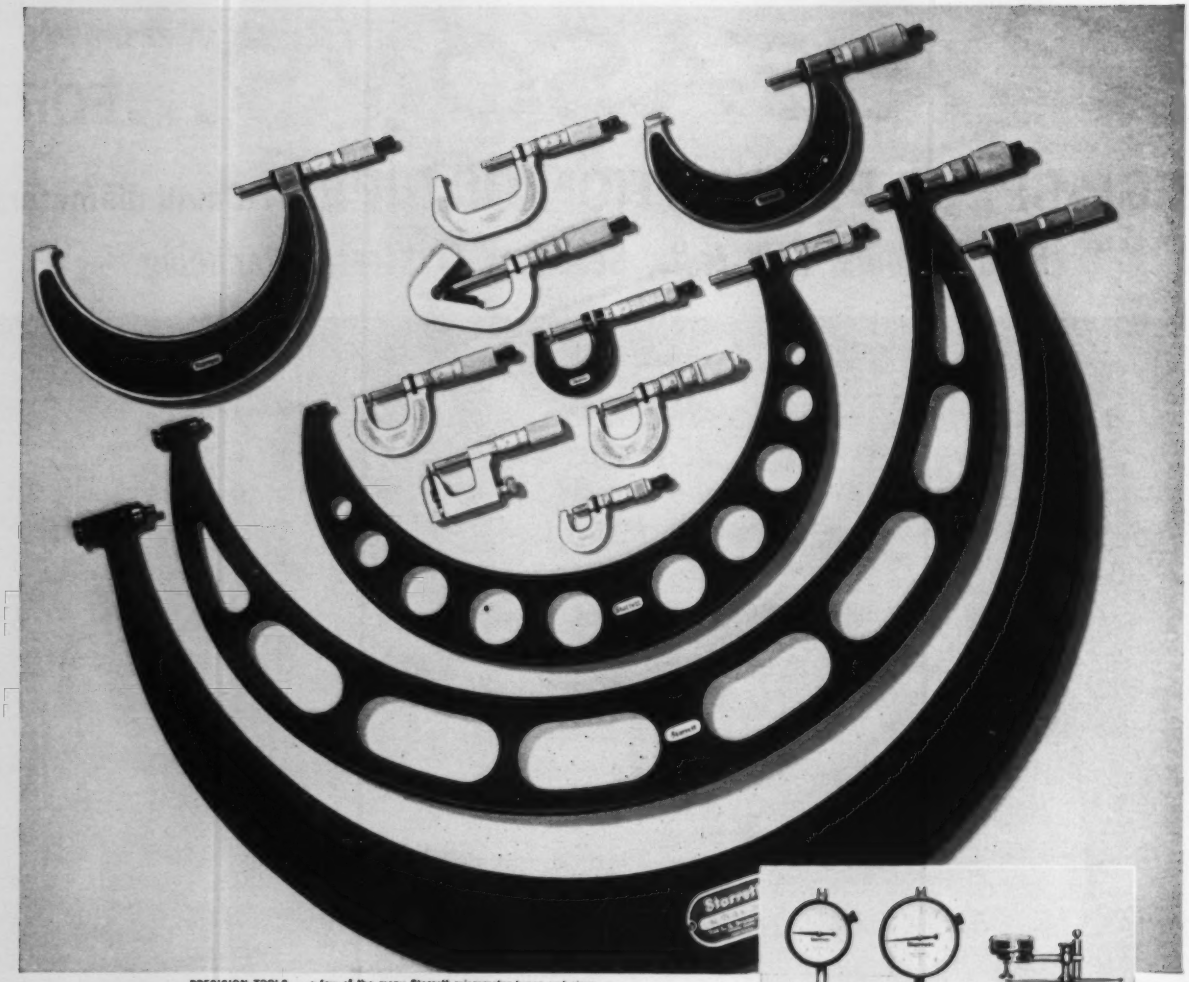

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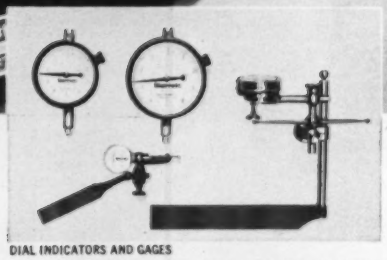

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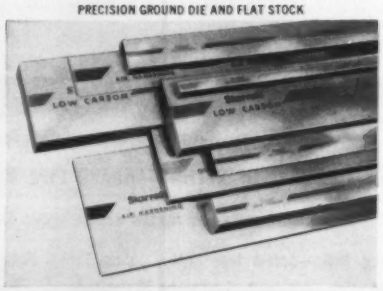

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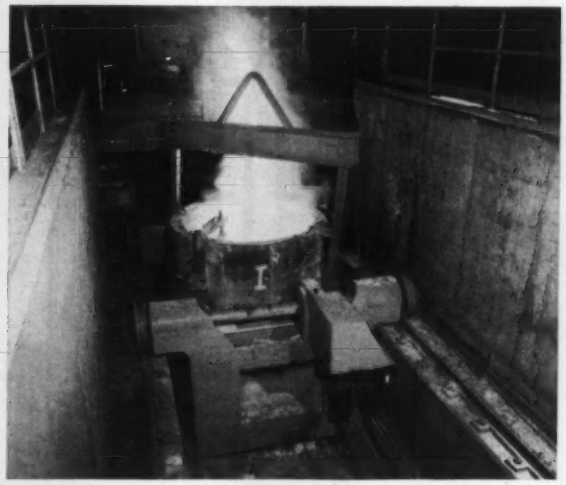
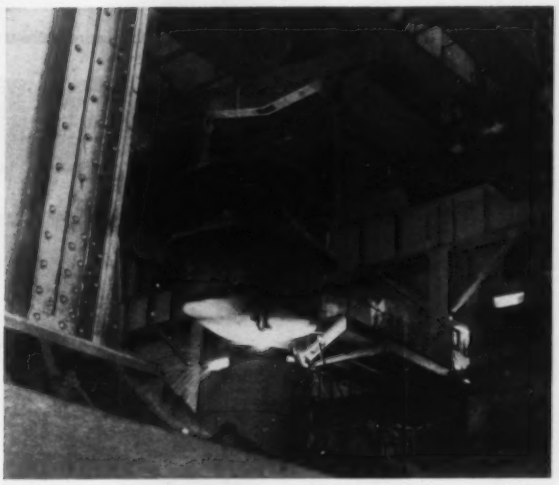




Air melt heats are tapped and taken to the vacuum degassing unit . . .

steels produced in the vacuum furnaces are being used for critical parts in aircraft jet engines, missile rocket motors, and in gas or steam turbines.

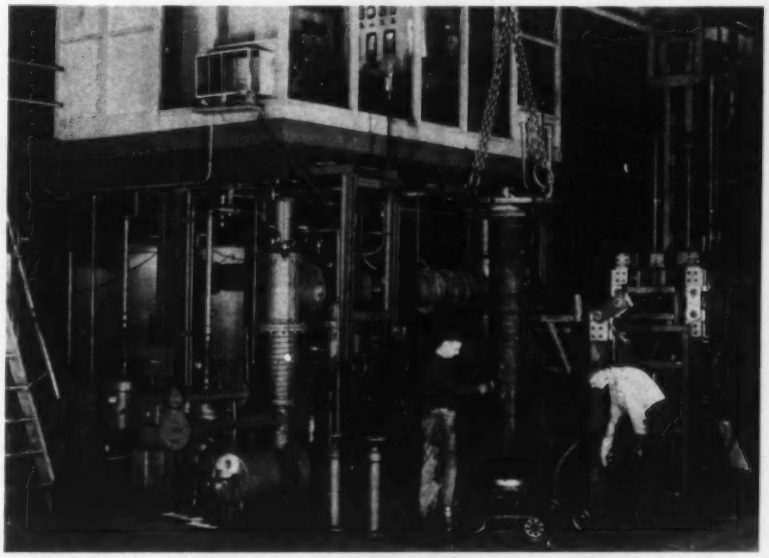
Low alloy and bearing steels are being used by makers of reciprocating and jet aircraft engines and by a number of bearing manufacturers. Vacuum quality stainless steels are also being specified for a number of uses.

The vacuum melted materials are able to pass rigid quality control tests and turn in more reliable service. Rejections for failure to pass mechanical property, macroetch, and sonic tests, or to meet microinclusion ratings are often reduced enough to make up for extra cost.

Example: Surveys in a customer's plant indicated that 90 per cent of the air melted, foil quality mill rolls under study contained objectionable nonmetallics. Those defects occurred in less than 10 per cent of the vacuum melted rolls that were examined. The vacuum melted rolls can be ground consistently to a black luster finish, says the customer, probably because of their fine, uniform grain structure.

• Many application needs for pure metals can be filled by the vacuum stream degassing process.

The quality of the company's air melted product is improved in many cases by a vacuum stream degassing system. Supplied by F. J. Stokes Corp., Philadelphia, it is designed to eliminate gases such as hydrogen, oxygen, and nitrogen from the molten steel.



Superalloy ingots are produced in vacuum furnaces

Originally, the degassing system was designed to degas ingots as they were poured. But the company's engineers developed a method of ladle to ladle, stream degassing for smaller ingots.

• Air melted steels are available in a variety of heat sizes; some large ingots are made by "team melting" in two or three furnaces.

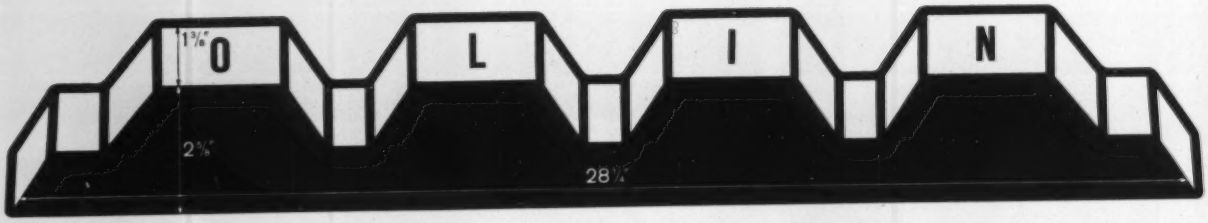
The firm's three, air melt, electric arc furnaces—with capacities of 30, 50, and 100 tons, were supplied by Swindell-Dressler Corp., Pittsburgh. Scrap for the furnaces is kept clean and dry by indoor storage.

Ingots from the three electrics are sold to other steel producers, forged at Midvale-Heppenstall, or used as electrodes in the vacuum melting department.

Air pollution control equipment, said to be more than 99 per cent efficient (by weight) is used on all three shells.

50-lb. ingot

25-lb. ingot



10-lb. ingot

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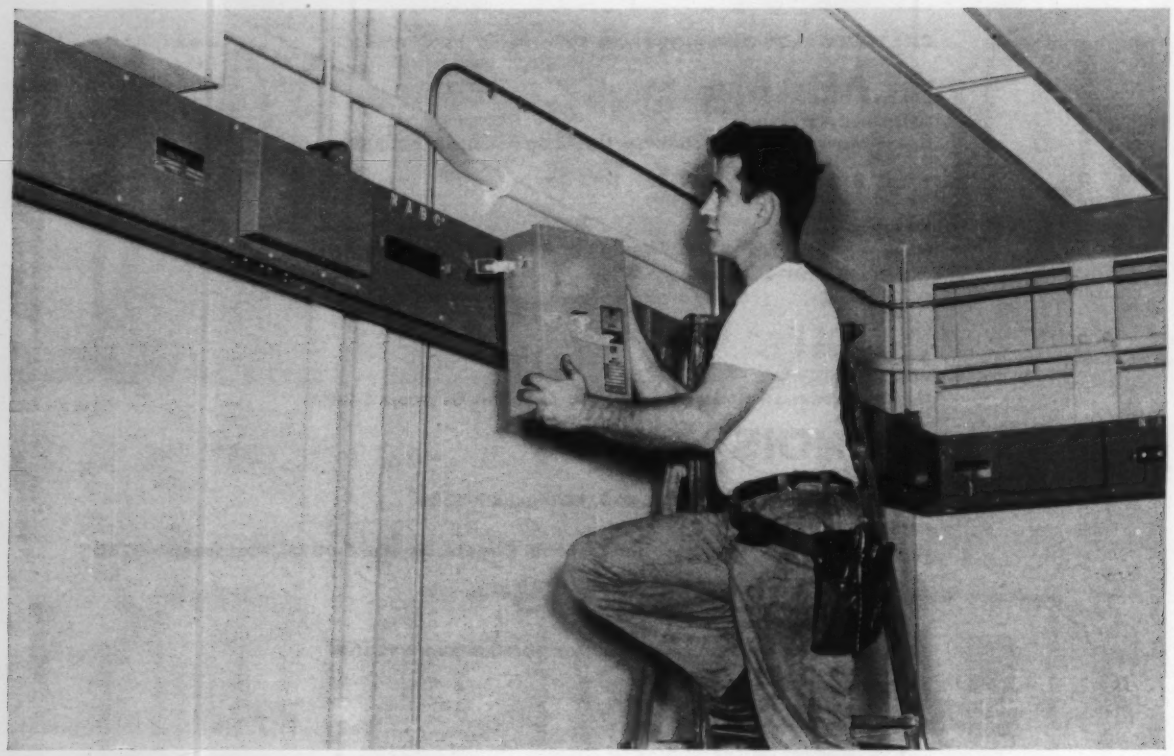


Easily installed system saves space, minimizes voltage drop when . . .

Ducts Distribute High Frequency Power

• AVAILABILITY of plant-wide, high frequency electric power and the promise of minimum voltage loss are prime benefits expected from a bus duct system installed at Grumman Aircraft Engineering Corp.'s new Avionics laboratory, Bethpage, N. Y. The system was supplied by Westinghouse Electric Corp., Pittsburgh.

The 400 cycle system, which employs ductwork designed for high frequency operation, will provide closely regulated voltages for experimental work throughout the lab.

• Easy installation and application flexibility may make for broader use of the ductwork.

The bus duct weighs in at only 14 lb per foot. And it is only 3⅞ in. wide by 9⅝ in. high. It is easy to install—simply hangs from the ceiling on cantilever or C-type hangers. And the system can be expanded or rearranged easily after installation.

The bus duct principle makes centralized power supplies more practical by servicing an entire plant from one high frequency generator. Many previous systems used small, individual motor-generators, deployed throughout the plant. Result: Voltages varied from one location to another.

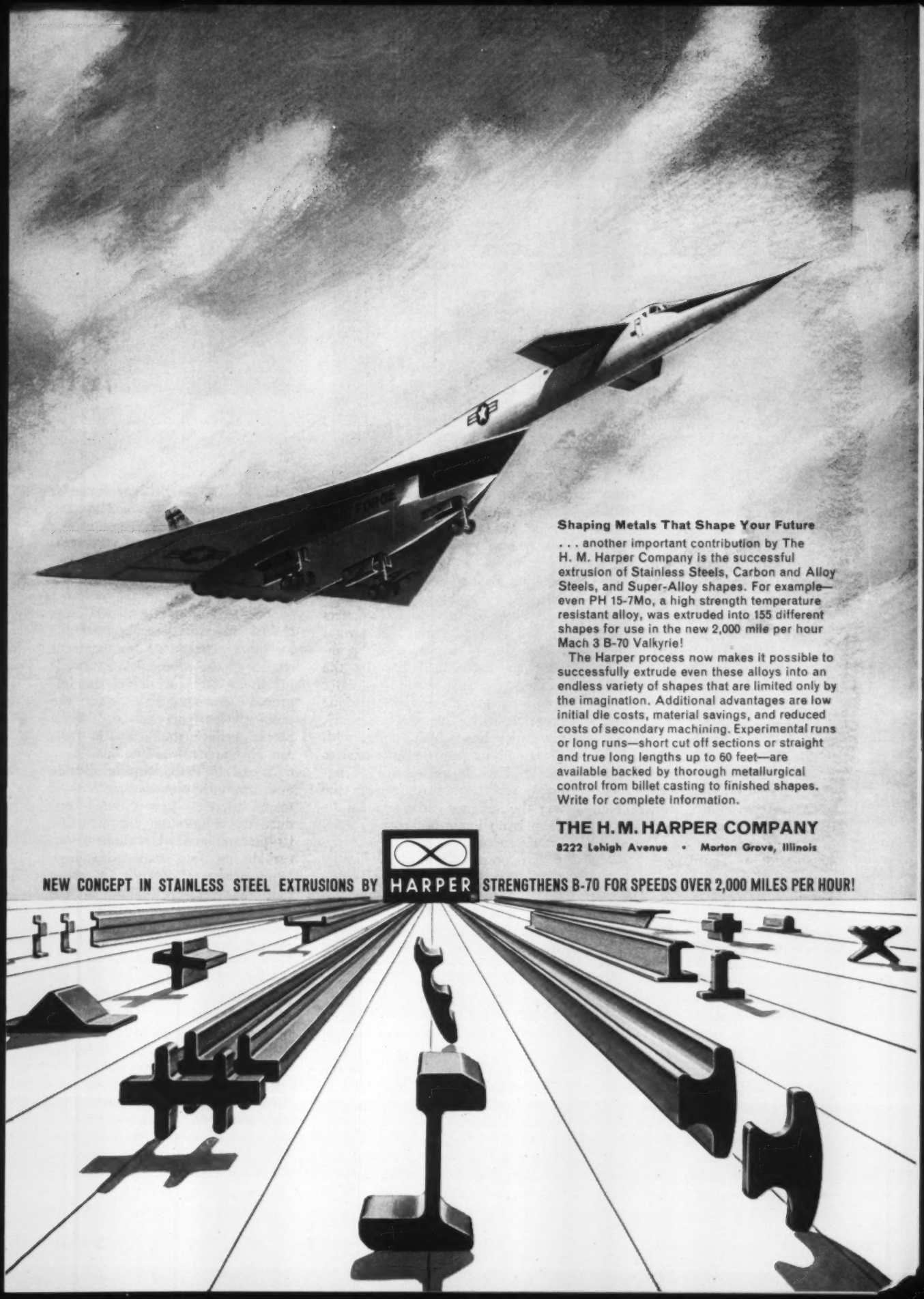
Power takeoff points are available every 30 in. along the ductwork. Plug-in units make for fast connection of apparatus to the power source.

High frequency power is becoming more important in commercial and industrial applications — like aviation production facilities and laboratories, electronics plants, missile and radar bases. Experts say the potential of electric power at frequencies above 60 cycles has not been tapped; that it will probably be used at first in key applications (like those mentioned), then in more general use areas.

• Careful arrangement of thin, flat conductors minimizes inductive reactance and voltage losses.

Design features: Busbars are interlaced and spaced on close centers. That helps reduce inductive reactance, which increases with frequency. Use of wide, thin gage busbars holds skin effect at a minimum.

Where duct sections are joined, phases are transposed—a complete phase transformation occurs in each three sections. But close bar spacing is maintained throughout the system for maximum efficiency. The voltage drop is said to be less than 1 volt per 100 ft of ductwork vs 7 to 12 volts per 100 ft in other systems.



Shaping Metals That Shape Your Future

. . . another important contribution by The H. M. Harper Company is the successful extrusion of Stainless Steels, Carbon and Alloy Steels, and Super-Alloy shapes. For example—even PH 15-7Mo, a high strength temperature resistant alloy, was extruded into 155 different shapes for use in the new 2,000 mile per hour Mach 3 B-70 Valkyrie!

The Harper process now makes it possible to successfully extrude even these alloys into an endless variety of shapes that are limited only by the imagination. Additional advantages are low initial die costs, material savings, and reduced costs of secondary machining. Experimental runs or long runs—short cut off sections or straight and true long lengths up to 60 feet—are available backed by thorough metallurgical control from billet casting to finished shapes. Write for complete information.

THE H. M. HARPER COMPANY

8222 Lehigh Avenue • Morton Grove, Illinois

NEW CONCEPT IN STAINLESS STEEL EXTRUSIONS BY HARPER STRENGTHENS B-70 FOR SPEEDS OVER 2,000 MILES PER HOUR!

Better Materials: Key To Cheap Nuclear Power

Less expensive construction materials, more efficient fuel elements are main targets of research

• CUTTING THE cost of nuclear power with better materials is one of today's biggest challenges in the opinion of Ulysses M. Staebler, senior assistant director, Division of Reactor Development, U. S. Atomic aluminum oxide.

He gives these examples of savings that could result from improved materials technology:

1. Substitution of low alloy for stainless steels in the primary coolant system of a 300 megawatt reactor would save $2 million to $3 million in construction costs. That is $7 to $10 per kilowatt of capacity which, at 14 per cent fixed charges on capital investment and an 80 per cent plant factor, is about 0.2 mill per kilowatt hour.

2. Improved methods of fabricating uranium fuel elements could reduce the cost about 0.1 mill per kilowatt hour for every $10 per kilogram reduction in fuel fabrication cost in a plant with a thermal efficiency of 28 per cent.

3. Improvements in materials which would permit longer fuel exposures could bring net savings on fabrication, reprocessing, and shipping costs. In a typical case, an increase of 2000 megawatt days per metric ton of fuel in an average exposure would cut fuel cycle costs 0.25 mill per kilowatt hour.

• The best practical design of a nuclear powerplant is not necessarily the one which runs longest on a fuel, or one which operates at the highest specific power, or the one which uses the lowest cost materials, says Mr. Staebler. Other factors, like fuel cladding to improve neutron economy, which cut maintenance and reduce radiation damage, also affect the reactor efficiency.

In designing a reactor, engineers must consider materials for several functions as a whole. Such problems are determined first by the method of energy removal: Water sodium, or gas, for example. Unique properties like neutron economy, physical values which change with time, and nuclear fuels themselves (some of which are ceramic in nature) are important factors; the way the designer chooses to handle them is an important part of a reactor's success.

Most power reactors rely heavily on stainless, at least as a cladding next to the coolants, but some organic coolants are being investigated so that ordinary carbon steel and conventional oil refinery fabrication practices may be employed.

Gas cooled systems also use carbon steel.

Those systems which use liquid coolants must be efficient enough to justify the cost of stainless, nickel-based alloys, columbium, molybdenum, tantalum, tungsten, titanium, or other less common materials.

• Nuclear engineers are interested in metal hydrides as moderator materials. Such materials are considered relatively new in the area.

In the last year, thermodynamic, x-ray, electroresistivity, and specific heat measurements have been done on zirconium-hydrogen systems. The material has high thermal stability and a low neutron cross section.

Some years ago, emphasis was shifted toward ceramic materials for fuel elements, but current studies of the mechanism of swelling in metallic fuel alloys has improved understanding, and the problem may be solved. Some people believe that metallic fuels can be employed above 1200° F.

In ceramic fuels, uranium dioxide and uranium monocarbide are of major interest. Low thermal conductivity of uranium dioxide limits its performance. Uranium monocarbide has been irradiated at high temperatures (1200° F) at about half the exposure values of the uranium dioxide and found essentially undamaged. Fabrication is the principal problem.

One of the big recent developments in fuel technology: Coated particles. An enriched uranium dioxide coated with alumina, distributed in graphite, was irradiated to a 6 atom per cent burnup at 1292° F. Fission gas release was slight. Only 3 per cent of the particles showed tensile failure of the coatings. Pyrolytic carbon coatings on uranium carbide also look promising at even higher temperatures, states Mr. Staebler.

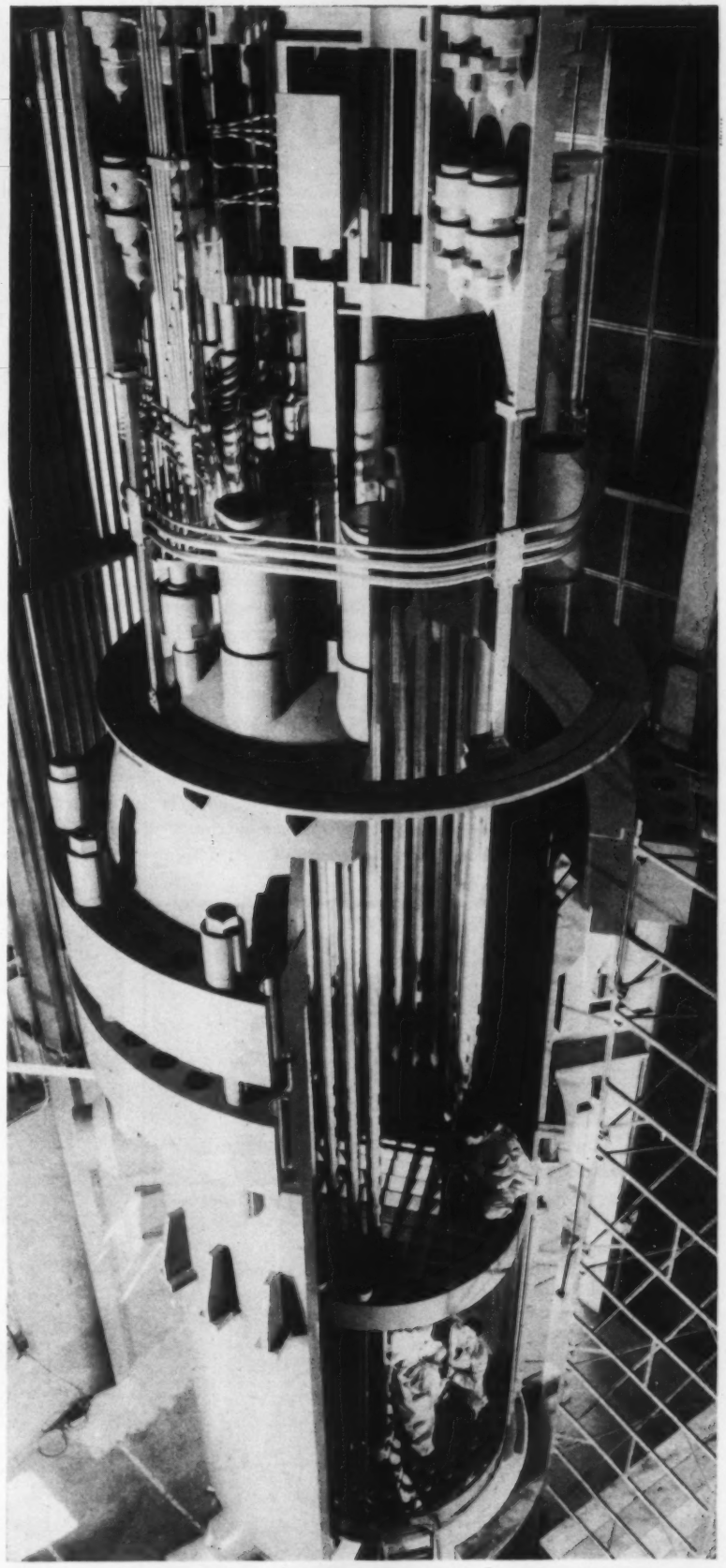
• Cladding materials which have

been receiving an increasing amount of attention: Beryllium, columbium, specially prepared graphite, cermets of aluminum and aluminum oxide.

Problems yet to be solved: Zirconium alloys need better strength at high temperature and less susceptibility to hydriding; stainless steel must be extremely thin to minimize parasitic capture of neutrons; beryllium fabrication must be improved to overcome poor ductility; graphite permeability needs further reduction.

Preliminary attempts to coextrude 0.001 in. stainless on zirconium are proving successful. If results are confirmed in further experiments, the combination may be used in water cooled reactors.

Techniques are needed for inspection and testing of products to prevent failures which could have disastrous consequences. Nondestructive methods are a prime weapon, Mr. Staebler believes. For example, a portable, transistorized, eddy current device sorts metals and alloys according to their electrical conductivity and permeability, and an ultrasonic device can locate cracks 1/32 in. in length in blanket elements for the reactor. Even better performance is expected from advanced techniques like neutron radiography and ultrasonic Lamb waves.



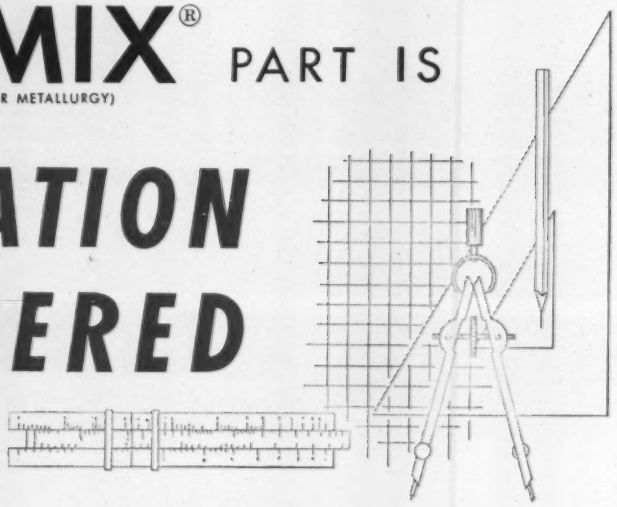
Westinghouse reactor mockup enables technicians to check design changes

TO INSURE SUCCESSFUL PERFORMANCE

EVERY GRAMIX® PART IS

(PRODUCTS OF POWDER METALLURGY)

APPLICATION ENGINEERED

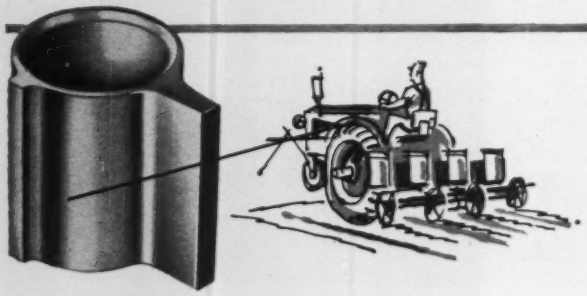


One of the most important factors to consider when purchasing powder metal parts is that of successful part performance; for a part to successfully perform its job, all of its physical and metallurgical characteristics must be suited to the application.

GRAMIX Products of Powder Metallurgy are always *Application Engineered,* which means product is specially matched to each specific application. From an almost unlimited variety of metal mixtures, one alloy is blended that contains the required properties and characteristics of the finished part; *all* aspects of part design and conditions under which it must operate are taken into account. Only then is the GRAMIX part produced.

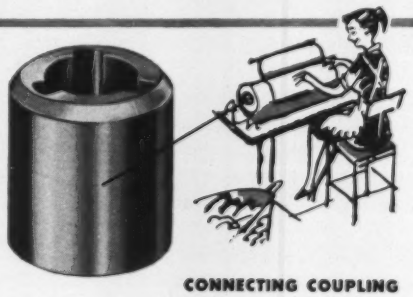
Eight of these *Application Engineered* GRAMIX parts are shown here. Each precisely suits the requirements of its job . . . each is the best part available for the job.

When you specify a GRAMIX part, you can always be sure that it has been *Application Engineered* for successful performance, long life and complete reliability. For more information on *Application Engineered* GRAMIX parts, write for Engineering Handbook G-55.



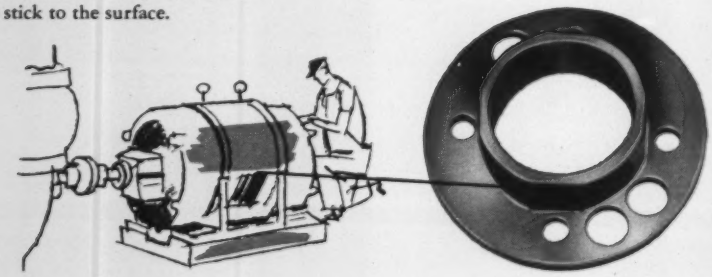
CORN SEEDER

GRAMIX was the material specified for this corn seeder part because the surface finish obtainable with the alloy used reduced the tendency of material to stick to the surface.



CONNECTING COUPLING

The connecting coupling employed in a small home ironer is formed from a special GRAMIX hardened steel alloy; it offers low wear and shock resistance.



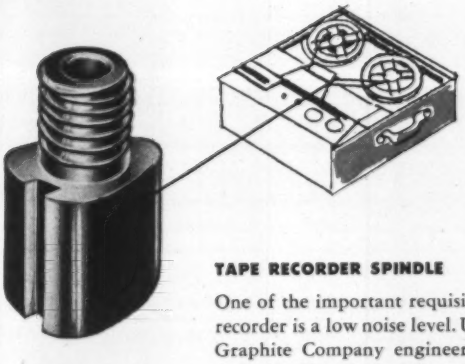
CONTAINER COVER END CAP

Great savings were realized when retainer caps for certain types of electric motors were made of GRAMIX.

This process made it simple and economical to mold the multiple holes to precise tolerances without extra operations.

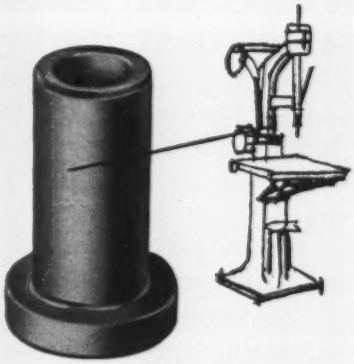
HELICOPTER THRUST WASHER

The outstanding features of the GRAMIX alloy specified for this thrust washer are a dependable and consistent friction and wear pattern as well as a fine surface finish.



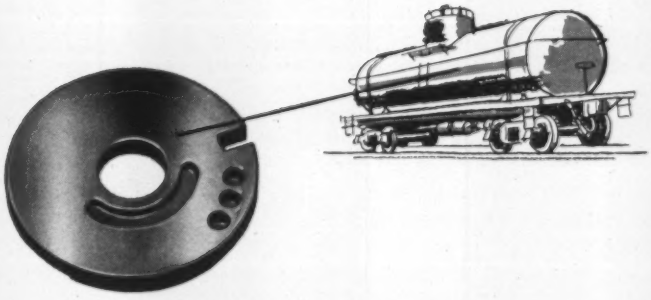
TAPE RECORDER SPINDLE

One of the important requisites in a tape recorder is a low noise level. United States Graphite Company engineers developed a special alloy to meet these requirements in the GRAMIX spindle.



GUIDE BEARING

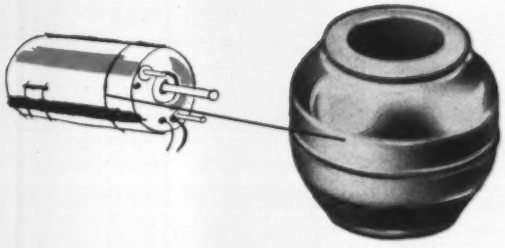
Built-in lubrication and low friction to reduce heat are important features of the GRAMIX alloy chosen for this guide bearing.



LIQUID PUMP END PLATE

This end plate is typical of many parts employed in liquid pumps of many types.

It is made from a wear resistant bronze alloy that was developed for pump applications.



FRACTIONAL H.P. MOTOR

The GRAMIX bearing for this Fractional h.p. motor was developed from a special low noise level alloy.

Its self-lubricating properties were also an important consideration in specifying GRAMIX.

METAL POWDER mpi INDUSTRIES FEDERATION

X-296-2

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 18, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDER METALLURGY • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

How's this for high-speed hobbing?

WORK PIECE					HOB (1 start)				Pieces per Load	Method*	Time per Piece	Pieces per Grind	Cut
Dia. Pitch	No. of Teeth	Helix Angle	Face Width	Material	Dia.	RPM	Feet PM	Feed					
10	20	15°	1¾"	1040 leaded	3"	500	395	.055"	1	A	2 min. 25 sec.	150	Finish
7	23	13°	¾"	8620	4"	350	370	.100"	2	A and B	59 sec.	240	Pre-shave
5	43	24°	1⅜"	8620	4"	280	300	.100"	2	B	3 min. 45 sec.	80	Pre-shave

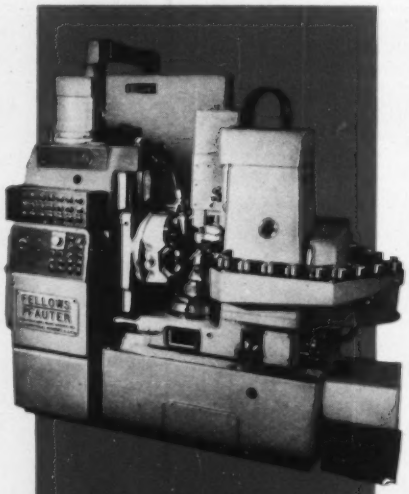
** Method A: Diagonal Hobbing. Method B: Step-by-step Hobbing.*

The chart shows the cost-cutting, high-production performance you get with the Fellows-Pfauter P 400 High-Speed Hobbing Machine. And here are some advanced design features that make it possible:

It's Easy & Fast to Handle. Work area is easily accessible for setup and loading • Automatic retraction of table from hob facilitates work changes • Pushbutton hob shifting • Built-in hydraulics for operation of tailstock and fixtures • Provides infinitely variable speeds and feeds.

It's Rigid and Rugged for High Production. Heavy, rugged hob head • Double wall construction column and bed, with heavy V-ways • Table as large as maximum work piece diameter • Index worm gear nearly as large as work table • Work support column of massive construction.

Saves time, floor space and production costs. Get complete details on the Fellows-Pfauter P 400 High-Speed Hobbing Machine.



The Fellows-Pfauter P 400 High-Speed Hobbing Machine can be equipped with automatic loading and unloading devices to further increase its productivity.

THE FELLOWS GEAR SHAPER COMPANY • 78 River Street, Springfield, Vermont, U. S. A.

Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Ave., Chicago 39, Ill.
6214 West Manchester Ave., Los Angeles 45, Calif.

THE PRECISION LINE

Fellows

Gear Production Equipment

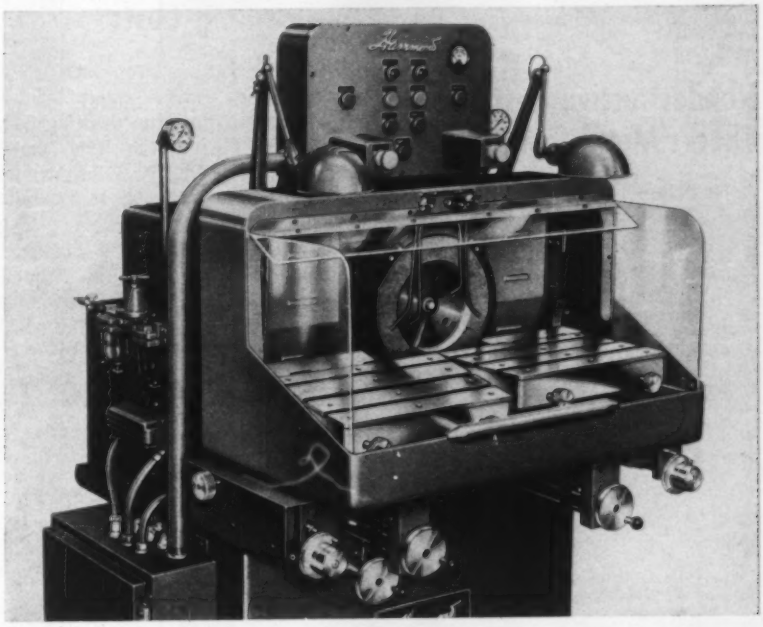
Units Grind Steel, Superalloys Electrolytically

TWO MODELS (EGD-12 and 14) have been added to the Hammond line of oscillating, electrolytic grinders. The units have duplex infeed tables and are especially suited for electrolytic grinding of steel and superalloy parts and carbide tools.

The company says no metallurgical damage results and products are burrfree. The units accommodate 12 and 14 in. diameter wheels and are built for automatic push-button, high production service.

The spindle oscillates on tapered roller bearings with a variable stroke of 0 to 2 in. and a frequency of 50 per minute. The insulated spindle has a 1500 ampere power pickup. Each of the two tables is fed by an air cylinder on ball bearing ways.

For further information, *write* Hammond Machinery Builders Inc., 1611 Douglas Ave., Kalamazoo, Mich.



Engine Lathe Has Continuous Path Tape Control

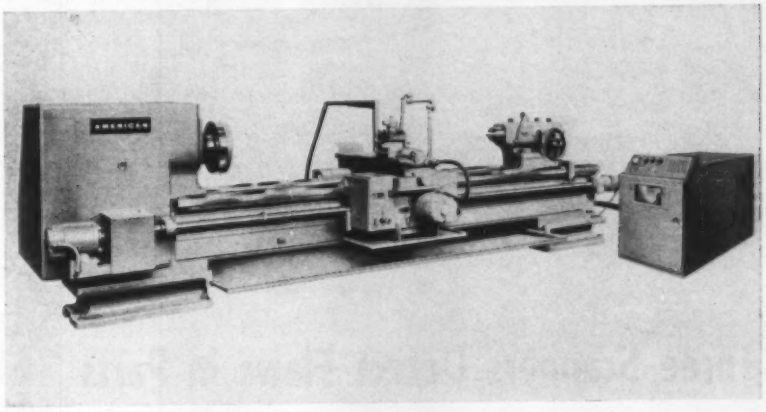
AN ENGINE lathe especially designed for continuous path tape control handles roughing and finishing on turning, boring, and facing operations. Four models are available, each controlled by a GE Mark Century continuous path system using 1 in., eight channel, punched tape.

Models 2010 and 2413 have two speed heads with a total speed range (with 16:1 motors) of 25 to 1800 rpm through 30 taped changes. Maximum motor size is 30 hp. Swing over the carriage wings for the 2010 is 21 in. and swing over the carriage bridge and tool block is 10 in. The 2413 swings 24 in. over the carriage wings and 13 in. over the carriage bridge and tool block.

The 2514 and 3019 also have two speed heads with a total speed range (with 16:1 motors) of 16½ to 1200 rpm through 30 taped changes. Maximum motor size is 50 hp. The 2514 swings 25½ in. over the carriage wings and 14 in. over the carriage bridge and tool block.

The 3019 has a 31 in. swing over the carriage wings and swing over the carriage bridge and tool block is 19 in. The main drive motor is mounted at the rear of the head and is connected directly to the initial driveshaft by a positive drive, multiple V-belt.

Three heavy bearings support the spindle. Starting, stopping, and



braking of the spindle is controlled by the main drive motor. All headstock gears are hardened and ground and automatically lubricated by cascade oiling.

For further information, *write* American Tool Works Co., Pearl at Eggleston Ave., Cincinnati 2, Ohio.

Nondestructive Test Checks Metal Composition

A NONDESTRUCTIVE test using the Model TE-1 thermoelectric probe detects differences between metals, alloys, and electroplated metallic coatings by their thermoelectric power.

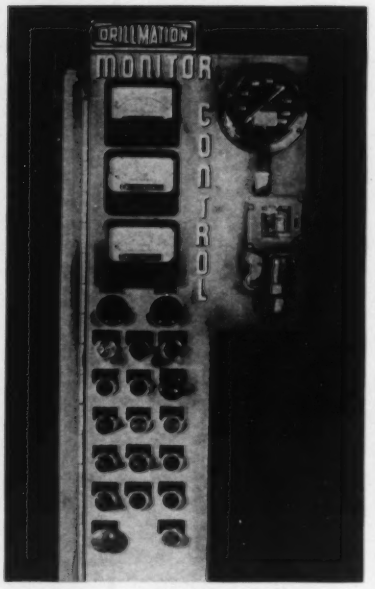
The company says metal bars or sheets which look alike can be separated according to their thermoelectric power by contacting two points of the metal and noting a reading.

For further information, *write* Electro Impulse Laboratory Inc., 208 River St., Red Bank, N. J.

Electronic System Pares Gun Drilling Costs

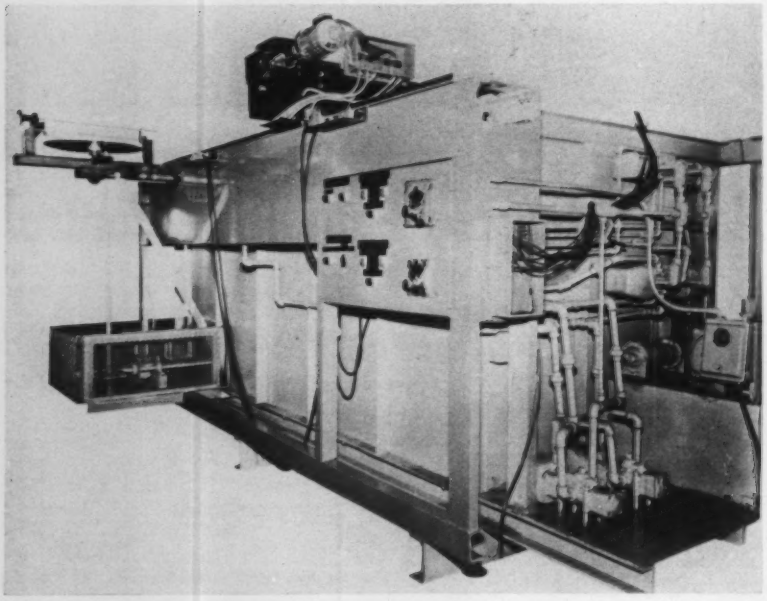
COST OF drilling deep holes can be reduced by using a Monitor Controlled Boremation gun drilling machine, says Drillmation. The Monitor Control or MC is an electronic system that is designed to remove guesswork from gun drilling.

Any deviation from a smooth, normal drilling operation immediately causes the MC system to stop feeding the drill to prevent damage to the work, tool, or machine. Dials (an integral part of the control panel) pinpoint the cause of the malfunction.



Extensive training is not required for operators, says the company. Once the work is clamped into position the unit automatically completes the operation. MC dials tell the operator the condition of the tool, workpiece density, spindle rpm, coolant flow, coolant pressure, and feed rate.

For further information, *write* Drillmation Co. Inc., 6500 E. Eleven Mile Rd., Center Line, Mich.



Three Scanners Detect Flaws in Parts

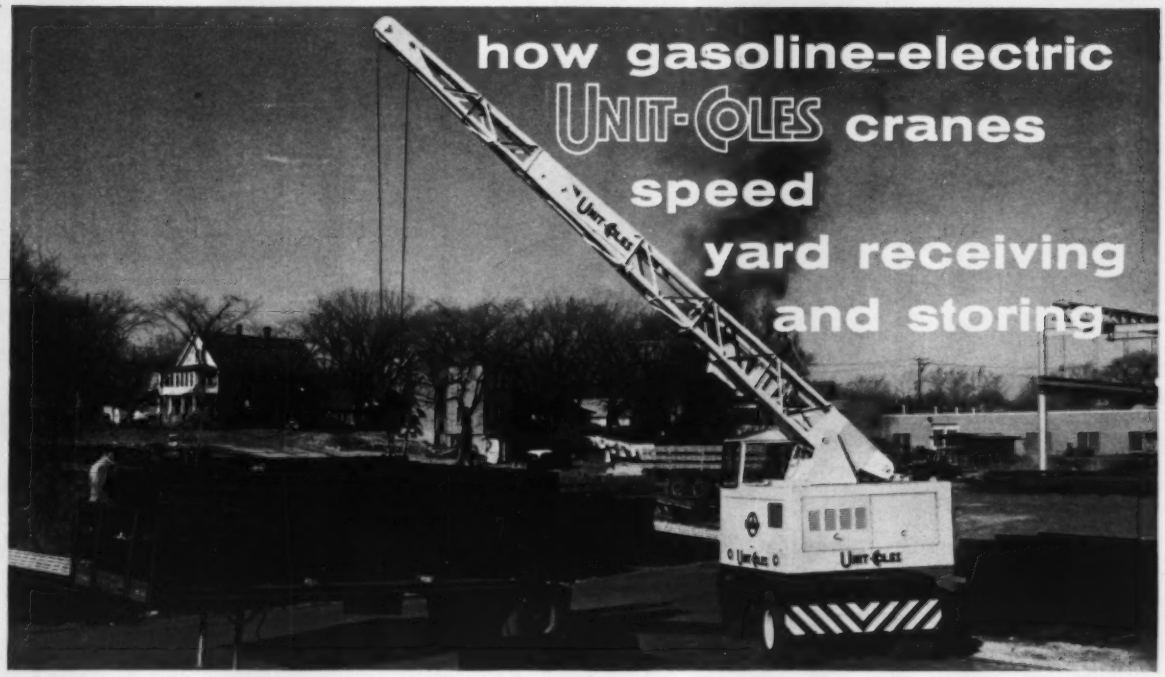
ULTRASONIC flaw detection of missile and aircraft parts is done by this Circo scanning system setup. The unit has a tank 5 ft wide, 5 ft deep, and 10 ft long. It's destined for the Middletown, Conn., plant of Pratt & Whitney Aircraft Div., United Aircraft Corp. Provided are three separate types of scanning operations: Horizontal, over the length of the tank; rotation, by use of a turntable within the tank, and spiral, by use of a special tubing scanner. For further information, *write* Circo Equipment Co., Rahway, N. J.

Ram and Turret Mill Serves Dual Purpose

IN PRODUCTION or in the toolroom, the No. 645 ram and turret mill is equally useful. The head on the vertical milling machine tilts 45 degrees forward and back and rotates 360 degrees on the ram. The turret rotates 360 degrees on the column and the power assembly rotates 360 degrees around the spindle.

The company says features such as 18 in. knee travel and 25½ overarm travel simplify setups and provide for quick setting of any compound work angle.

Distance from the spindle to the table ranges from 0 to 19½ in. Distance from the center line of the spindle to the column ways (with the spindle in vertical position) ranges from 1½ to 27¼ in. The



- *no gear changing, clutching or de-clutching*
- *simple, finger-tip control*
- *time-saving independent or combination hoist, swing and travel*
- *fast, one-man operation*
- *smooth, precise lifts*
- *world's safest crane*

Unlike ordinary clutch-type yard cranes, the UNIT-COLES has no clutches — no gears to change — just an uninterrupted flow of power, with the most precise control. An engine-generator unit powers separate electric motors for boom-hoist, load-hoist, swing, and travel. As a result, every motion is fast and precise, with no jerking or grabbing when picking up or spotting a load.

Control is simple and fast — effortless as flipping a light switch. The load is powered up and down at any speed from less than a foot per minute to 150 f.p.m. The brakes are automatically applied, preventing load drift and accidental load loss. To meet a variety of job requirements, your operator can lift, boom, swing, and travel simultaneously or separately. "Instinctive" steering — left for left and right for right — with the revolving superstructure in any position, eliminates costly steering errors when maneuvering in congested areas.

For positive protection of employees, load, and crane, UNIT-COLES offers an exclusive Automatic Safe Load Controller that pre-warns of dangerous load conditions — stops and holds the load and boom when the maximum safe load radius is reached. Quickly adjustable limit switches prohibit dangerous over-travel of the boom and hook block. Should the engine stop, automatic "fail-safe" brakes immediately stop all crane motions. "Dead man" type controls automatically set the brakes if accidentally released.

Take a new look at your own receiving and storing problems — then compare the superior UNIT-COLES advantages when considering a new yard crane. For further information on UNIT-COLES Cranes in capacities from 5 to 55 tons, and the name of your nearest dealer, write or wire collect today.

THE WORLD'S SAFEST CRANE

UNIT-COLES

UNIT CRANE & SHOVEL CORP.
6721 W. Burnham Street
Milwaukee 19, Wisconsin

stacks high in tight quarters

See how the UNIT-COLES "threads" itself through a narrow aisle, to stack these big, heavy containers 30 ft. high. With the cantilever boom, this crane can work closer to the stack, with less aisle room, and can stack higher because of the high pivotal point of the boom. And the UNIT-COLES has a shorter tail-swing and turning radius, allowing a full 360° swing in a narrow 12 ft. aisle.

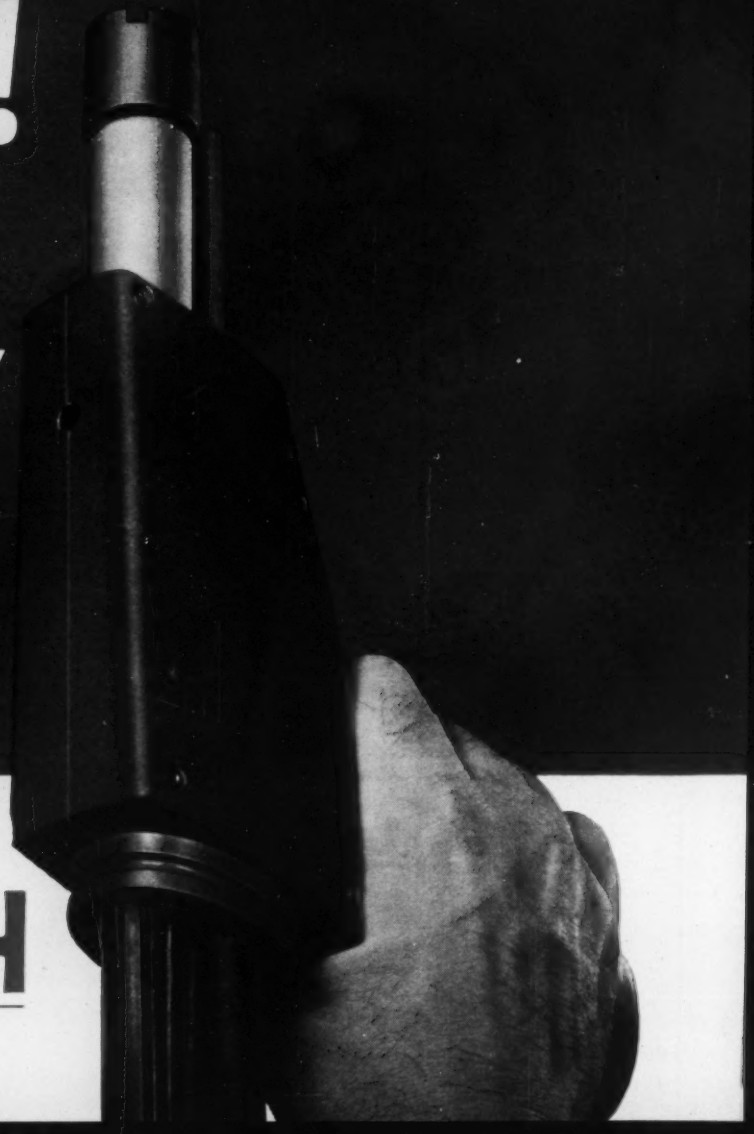
RIGHT ON THE BUTTON EVERY TIME!

The swiftest, simplest, surest way to fasten metal . . .

NEW BUTTON WELD

BY

A.O. SMITH

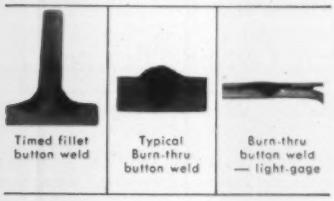


C-OMANUAL button welding boosts output . . . cuts rejects

Here's one button the zipper hasn't replaced. In fact, this button process is the latest development in welding — a development that has replaced old-fashioned spot-resistance welding and riveting.

Armed with a lightweight hand gun using A. O. Smith's CO_2 C-OMANUAL process, the operator works from one side only. The button burns through to fasten steel up to 3/16 in the downhand position and 3/64 in the vertical. And welders take their helmets off to button welding — no need to wear one with this A. O. Smith process. Simple, too! Special operator training is not required. Just place the gun . . . pull the trigger! Hold until the welding stops *automatically*. Perfect button weld every time . . . no flux to clean.

Choice of nozzles permits welding of any of the standard joints (lap, fillet, butt).



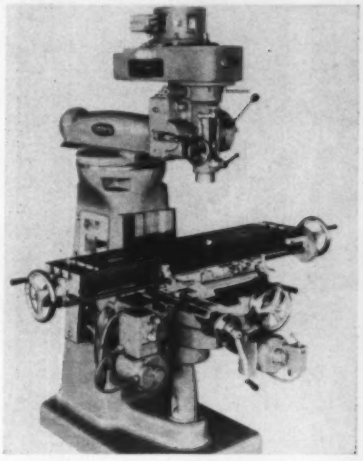
Timed fillet button weld | Typical Burn-thru button weld | Burn-thru button weld — light-gage

Other button blessings include quality low-hydrogen weld metal, high deposition rates, full utilization of weld metal for low overall costs. Put this high-speed production tool to work for you. Send for Bulletin MW-253 for details.

Through research ... *a better way*

A.O.Smith
CORPORATION
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
A.O.Smith INTERNATIONAL S.A. Milwaukee 1, Wis. U.S.A.

NEW PRODUCTS and equipment



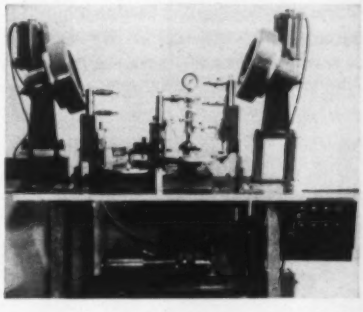
spindle has a vertical travel of 5 in. Nine spindle speeds are provided with the standard 1 hp motor. Three spindle feeds have adjustable depth and power feed up as well as down. Extras are available.

For further information, *write* Index Machine Co., 572 N. Mechanic St., Jackson, Mich.

Unit Assembles Miniature Components Automatically

AUTOMATIC and semiautomatic production of miniature assemblies can be done on the Aidlin assembly tables. The unit shown has been tooled for production of Teflon clad terminals at rates up to 3600 assemblies an hour.

The Teflon bodies have diameters of 0.125 in. or smaller. The terminals are variously shaped pins having outer diameters as small as 0.046 in. Each of two overlapping circular discs (synchronously driven) provides six positions with shot-pin to maintain alignment at each stop position. Nine widely spaced work stations are available for a number of insertions and operations.

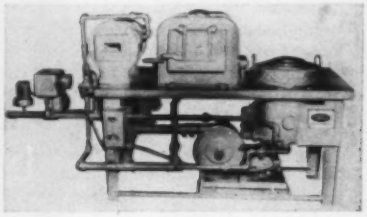


The unit has wide flexibility due to the ease of changeover on the nests and part hoppers. Combinations of six hopper feeders or part positioners may be used with the assembly table. To create more work stations, index discs may be changed and replaced by discs up to 18 in. in diameter.

For further information, *write* Aidlin Automation Inc., 1613 E. New York Ave., Brooklyn 12, N. Y.

Furnace Handles Many Heat Treating Operations

PRACTICALLY every heat treating operation can be done with a Model TP-D, combination, triple purpose furnace, says the manufacturer. It can be used for hardening, forging, welding, tool dressing, annealing, normalizing, pack carburizing, and nonferrous metal melting.



The company adds that its versatility and compact design make it especially adaptable for toolrooms, small shops, and similar uses.

The three furnace unit consists of a pot furnace, an oven, and a forge. It is available for gas fired heating in five standard sizes.

For further information, *write* Sunbeam Equipment Corp., 168 Mercer St., Meadville, Pa.

Efficiency of Ultrasonic Drill Upped Twofold

IMPROVEMENTS make the Glennite ultrasonic drill (Model D-101A) almost twice as efficient in multiple machining, slicing, cutting, and etching as the older Model D-100A, says the company.

The unit will handle tool sizes up to ¾ in. on a diagonal. Sample

CUT COSTS WITH MEEHANITE CASTINGS

You get more for your money when you order castings from a Meehanite foundry — consistent high quality, maximum economy . . . from initial cost through production, plus reliable performance in service.

Meehanite foundries are your best sources for almost every casting requirement. They offer a complete line of high strength metals, the most advanced casting methods, expert assistance, and make every effort to give you on-time delivery.

Check the list below for the Meehanite foundry nearest you.

CALL A MEEHANITE FOUNDRY FOR SERVICE

CALIFORNIA
Lincoln Foundry Corp., Los Angeles
Vulcan Foundry Co., Oakland

CANADA
Dorr-Oliver-Long, Ltd., Orillia, Ontario
Hartley Foundry Div., London Concrete Machinery Co., Ltd., Brantford, Ontario
Otis Elevator Co., Ltd., Hamilton, Ontario

COLORADO
The Stearns-Roger Mfg. Co., Denver

GEORGIA
Georgia Iron Works, Augusta

ILLINOIS
Greenlee Foundries, Inc., Chicago

INDIANA
Casting Service Corp., LaPorte
Sonith Foundries of FMC, Indianapolis

MASSACHUSETTS
The Henry Perkins Co., Bridgewater
Standard Foundry Co., Worcester

MICHIGAN
Atlas Foundry Co., Detroit
Casting Service Corp., Bridgman
General Foundry & Mfg. Co., Flint

MISSOURI
Banner Iron Works, St. Louis

NEW YORK
American Laundry Machinery Industries Div., McGraw-Edison Company, Rochester
Pohlman Foundry Co., Buffalo

NEW JERSEY
Barnett Foundry & Machine Co., Irvington
Florence Pipe Foundry & Machine Co., Florence
Palmyra Foundry Co., Inc., Palmyra

OHIO
Centrifugally Cast Products Div., The Shenango Furnace Co., Dover
Dayton Casting Co., Dayton
Fulton Foundry & Machine Co., Cleveland
Hamilton Foundry Inc., Hamilton

OREGON
Crawford & Doherty Foundry Co., Portland

PENNSYLVANIA
Kennedy Van Saun Mfg. & Eng. Corp., Danville
Rosedale Foundry & Machine Co., Pittsburgh

TENNESSEE
Ross-Meehan Foundries, Chattanooga

TEXAS
Oil City Iron Works, Corsicana

WASHINGTON
Washington Iron Works, Seattle

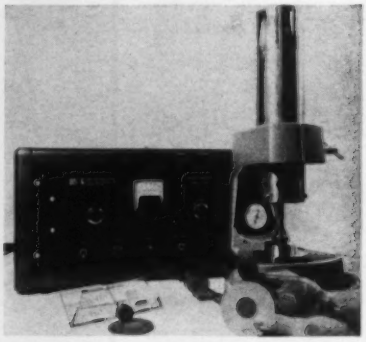
WEST VIRGINIA
Kanawha Manufacturing Co., Charleston

WISCONSIN
Love Brothers-Pyott Foundry & Machine Div., Mueller Industries, Inc., Milwaukee

MEEHANITE METAL

MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES.

NEW PRODUCTS and equipment



per minute rates using the ¾ in. tool include tool steel at 0.008 in., ferrite at 0.030 in., glass at 0.200 in., ceramic at 0.060 in., and germanium at 0.050 in. Holes as small as 0.002 in. (diameter) can be drilled in ferrites, ceramics, and tungsten carbide.

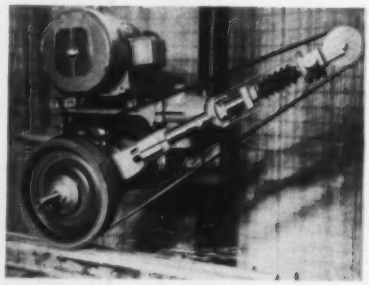
The manufacturer says the unit can efficiently machine white sapphire into instrument bearing blanks, drill holes in ceramic or glass insulators for electronic tubes, machine port cavities in servomechanisms, and drill holes in epoxy resin reinforced with glass fibers.

For further information, *write* Vibro-Ceramics Div., Gulton Industries Inc., 212 Durham Ave., Metuchen, N. J.

Unit Converts Buffing Lathes to Belt Polishing

AN ATTACHMENT that is easily installed on adjustable buffing lathes is designed to provide an economical means of adding abrasive belt polishing operations to existing equipment and to increase flexibility of production finishing operations.

The attachment, a lightweight

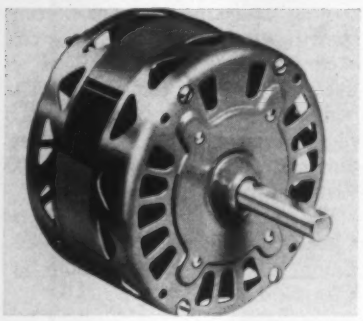


belt arm, is easily mounted on the spindle housing of buffing lathes. The belts are spring loaded between a contact wheel and an idler pulley. A spring loaded lever permits rapid and easy belt changing. The units can handle belts from 2 to 8 in. wide and from 96 to 132 in. long. The belt arm attachments can also be arranged for other belt lengths.

For further information, *write* Acme Mfg. Co., 1400 E. Nine Mile Rd., Detroit 20, Mich.

Starting, Running Torques High on Small Motors

THE LIGHTWEIGHT motor (Type AR) introduced by Redmond is 4⅞ in. in diameter. High starting and running torques are reported. The company says it is ideal for applications where space limitations are critical.



The motor is a six pole type. Horsepower: 1/20 to ¼.

For further information, *write* Redmond Co. Inc., Owosso, Mich.

Resin System Makes Strong Molds, Cores

A RESIN hardener combination produces shell molds and cores having high strength and hot rigidity.

The company says the resin (Bakelite phenolic resin BRL-5009) is water-borne, making the solution nonflammable. Bakelite phenolic hardener BRP-0314 is used with the resin. The combination can be processed in a variety of sand mullers with hot air supply and also can be used with preheated sand.

The strength of the resin system is valuable in making shells and cores with good thermal shock resistance, and without shell cracking,

This Pannier Offset Bar and Tube Printer at the Superior Tube Company, Norristown, Pennsylvania, is shown marking tubing. The tubing moves from the marker right to a delivery table, ready to bundle for shipment.

MARK BARS, EXTRUSIONS AND TUBING QUICKLY, CLEARLY FOR EASY IDENTIFICATION

The Pannier Offset Bar and Tube Printer marks tubing clearly at a controlled rate of up to 450 feet per minute in a wide range of sizes. It is designed to handle rounds from ⅛" O.D. to a maximum size of 14" O.D. Simple adjustments compensate for the various sizes of material to be marked, including flats up to 4" wide. Adjustable side guide rolls are available as optional equipment to permit printing on flat material from 4" to 14" wide.

Top surface printing permits constant inspection. Fast drying inks permit immediate handling. The standard offset printer is right-hand feed; left-hand feed is available to fit your conveyor line system without disrupting present line movements.

This unit (Model 8) will print a 24" continuous legend; Model 12 will print a 36" continuous legend using either premolded rubber dies or changeable type, which range in size from 1/16" to 2½" characters. Fast type setting saves valuable production time and speeds up deliveries. Printing components, which include the die wheel, printing wheel and drive wheel, are available in three sizes, depending on size of the characters desired. Printing components are quickly and easily interchanged.

The Pannier Offset Bar and Tube Printer is available with a ¾ horsepower variable speed motor, or is friction driven from your existing conveyor for continuous flow materials. Power is applied to the conveyor rolls. Movement of the tubing turns a friction drive wheel which turns the printing head. There is no ink buildup on the offset printing wheel, insuring clear marking.

Pannier also has a small model Offset Wire Bar and Tube Printer, which is recommended for printing materials less than 4" O.D. Pannier engineers will be glad to consult with you on all your marking problems. For complete information, write:

PANNIER MASTER MARKERS
384 Pannier Building
Pittsburgh 12, Pa.

MASTER PANNIER MARKERS

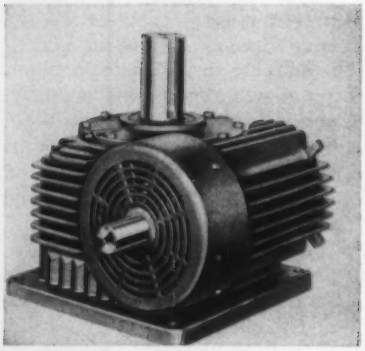
peel back, or hot tearing of castings. Dwell and curing times of shell molds and cores are short, making the resin hardener applicable for high production work.

The system is reported to produce good surface finish on castings. Strength and resistance to thermal shock of shell molds made with the combination yields a high degree of dimensional stability and tolerance control. In some applications, says the company, machining and drilling operations are eliminated.

For further information, *write* Union Carbide Plastics Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Vertical Units Extend Speed Reducer Line

NINE sizes of vertical units have been added to a line of fan cooled, worm gear, speed reducers. The units have center distances ranging from 3 to 12 in. Ratios extend from 4 1/7:1; ratings are fractional to 175 hp.



The units have one piece, finned housings for maximum strength and heat dissipation. Gearshaft bearings are grease lubricated with two fittings for each bearing. Oil seepage is prevented by using a dry well around the outputshaft and extending it above the oil level. The units have the same features (fan cooling, specially hardened worms, centrifugally cast gears) that were originally designed in the first reducers of the fan cooled line. The company says they have a much higher average rating than comparable reducers not having an auxiliary means of cooling.

For further information, *write* Cleveland Worm & Gear Div., Eaton Mfg. Co., 3300 E. 80th St., Cleveland 4, Ohio.

COST-CUTTER

The *only* accurate way to measure your abrasive costs is to determine *cost per ton of castings cleaned—not* just the cost of abrasive.

Rotoblast Steel Shot and Grit clean castings at lower cost per ton than other abrasives. That is why Rotoblast Steel Abrasives are the fastest growing on the market today. *Sales volume has tripled in 3 years!*

Low phosphorus, low sulfur steel and a special heat-treating process make Rotoblast Steel Shot and Grit solid, tough and free of voids and hollows—that's why they can save you so much on cleaning costs. For actual figures, write to:

PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada Ltd., 38A Mattson Rd., Toronto, Ontario:—*Manufacturers of Rotoblast® Steel Shot and Grit®; Blast Cleaning, Vibratory Finishing, Dust Control Equipment.*

Pangborn
OF HAGERSTOWN

Current Sensing Relays Come Tapped or Untapped

A CURRENT sensing relay (Type COD) for switching and control operations has independently adjustable high and low current stationary contacts. It's available with either a tapped or a nontapped electromagnet.

The tapped COD relay is supplied in these ranges: 0.5 to 2.5, 2 to 6, and 4 to 12 amperes, ac. The scale on the relay is marked in percentage of tap value, with a range of 80 to 110 per cent. The nontapped unit is available with a range of 0.5 to 2.0, or 1.5 to 6 amperes, ac. The scale on the nontapped relay is marked directly in amperes.

For further information, *write* Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

NEW literature

Write directly to the company for a copy

Hard Cemented Carbide Data

Profitable utilization of high rigidity in a material that has three times the stiffness of hardened steel is spotlighted in a 16 page booklet. Kennametal Inc., Latrobe, Pa.

Self-Locking Fasteners

A 64 page design manual focuses attention on reduced dimension, lightweight types of self-locking fasteners. It is a concentrated package of nut shapes covering complete lines of miniature hex, anchor, and clinch types. Advertising Dept., Elastic Stop Nut Corp. of America, 2330 Vauxhall Rd., Union, N. J.

Corrosion Guide

A 24 page brochure is offered to manufacturers as an aid in building corrosion resistance into their products and properties. The guide analyzes seven basic types of corrosion and shows what specific kinds of metals best resist them. H. M. Harper Co., Morton Grove, Ill.

New Etch Resist

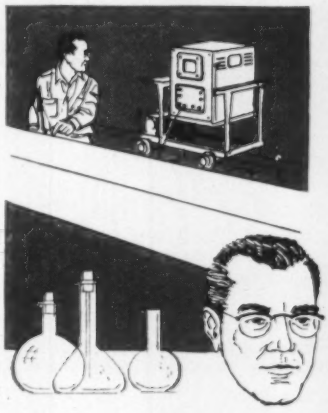
Resist-Etch blocks off unwanted electroplate and permits pattern lines 0.005 in. wide and 0.005 in. apart. Its properties and advantages are described in a four page bulletin. Chemical Div., Meaker Co., Nutley, N. J.

NEW BOOK

Metals Handbook, Eighth Edition, Vol. 1, Properties and Selection of Metals, Edited by Taylor Lyman, American Society for Metals, Novelty, Ohio, 1300 pages, $30

Dealing with the selection and properties of metals, this is the first of a projected series that will cover all branches of metals engineering and metalworking. An enlarged section on carbon and low alloy steels contains 26 major articles—12 on steel products and 14 on selection for specific engineering properties, economy, and special processing considerations. Major processing factors are covered in articles on selection for economy in machining, selection of low carbon steel sheet formability, deep drawing, porcelain enameling, and others. The section on stainless steels includes coverage of cast and wrought types including the more recently developed precipitation hardening alloys. A section on tool materials includes 18 articles on 18 specific types of tools. Major nonferrous metals are covered. More pages are assigned to magnetic, electrical, and other special purpose metals, precious metals, and the properties of pure metals. A glossary of 2800 definitions appears at the front of the book.

METALLURGIST REPORTS:



Soffel's

EXOTHERMIC SIDEBOARDS

"produce sound fully killed steel . . . in line with ladle analysis of the heat."

". . . ultrasonic tests show complete ingot soundness . . . macro-etch tests show good quality . . . chemical analysis of the ingots are in line with ladle analysis of the heats."

A trial run in your plant will prove beyond question, you'll get sound steel and MORE OF IT with Soffel's Exothermic Sideboards.

Phone NAtional 5-1571

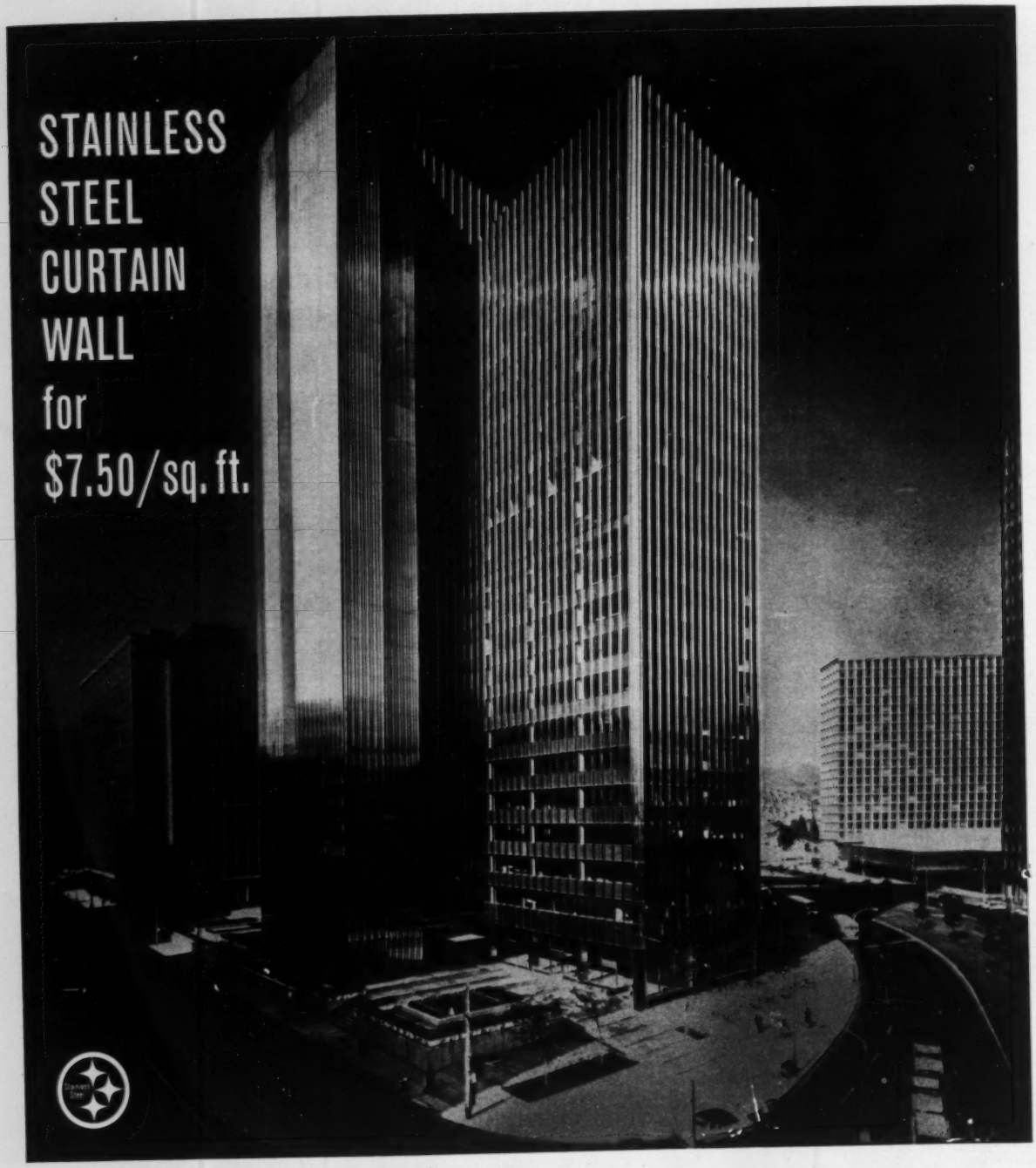
PRODUCT ADVANTAGES

- **Eliminate permanent and conventional hot tops.**
- **Easy, and single, stripping of Big End Down molds.**
- **Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.**
- **Longer mold life — less mold cost — less mold inventory to carry.**

Soffel's Exothermic Sideboards increase ingot yield, assure top cut soundness and provide more ton steel out the door per ton of steel in the ingot.

Pittsburgh Metals Purifying Co.

MARS, PENNSYLVANIA



Pittsburgh's Four Gateway Center is one of the most dramatic architectural uses of stainless steel in the world today. Even more dramatic to the architect, builder and owner is the remarkably low $7.50 per sq. ft. erected cost of the stainless steel curtain wall.

Washington Steel's gray ColorRold provided the means for accenting the vertical lines that make this edifice one of the most talked about buildings of our era.

4 Gateway Center, Pittsburgh
Harrison & Abramovitz, *Architects*
Limbach Co.,
Curtain Wall Contractor

WASHINGTON STEEL CORPORATION

and ColorRold®

PRODUCERS OF *MicroRold®* STAINLESS SHEET & STRIP

WASHINGTON, PA.

STEEL

Signs of Strength Multiplying

STEEL DEMAND is definitely on the upswing—held to a gradual rise only by subnormal auto production.

The impetus is mostly seasonal and the gains aren't dramatic, but market analysts are now convinced that the favorable signs they've seen aren't of the will-o'-the-wisp variety. They expect orders to climb steadily during the second quarter as construction accelerates and manufacturers step up their output of durable goods.

HEAVY PRODUCTS GAIN—The upturn in building activity is already being felt at mills that produce structural shapes and plates. In Chicago, some steelmakers report that their bookings for those products have picked up 15 to 20 per cent in the last few weeks. Eastern mills say the number of orders placed has been increasing more rapidly than aggregate tonnage, indicating that many users have depleted their inventories. Inquiry for plate specialties used in the chemical and food processing industries is lively. In spite of the moderate pickup, there has been no extension of deliveries and none is considered likely before midyear.

GALVANIZED SHEETS TOO—Like plates and structurals, galvanized sheets are benefiting from the upturn in building activity. They're needed in light construction, building repairs, culverts, farm equipment, and air conditioning. Deliveries are lengthening. Although some mills can still ship from stock, many are quoting three to four weeks delivery and some have nothing to offer under six weeks.

AUTOMOTIVE UPTURN?—If the recent uptrend in auto sales and production continues, it may trigger the release of more steel orders in May than the mills have been expecting. Case in point: A Detroit automotive parts manufacturer that had previously announced it was set for the 1961 model run now says it will need a "fair" tonnage in May. Chances for a pickup in steel shipments to the automotive industry before May are poor. As one Big Three marketing executive told STEEL: "Our inventory of cars is still pretty high. We'll need a month of good, solid sales before we'll have to step up our production. In the meantime, we have all the steel we need. Our suppliers are loaded with parts."

DISTRIBUTORS SEE PICKUP—Steel shipments from service centers in March were about 10 per cent higher than February's and the best since the third quarter. The upturn reflects higher consumption and the depletion of inventories. A Detroit distributor, noting the March improvement, told STEEL he expects continued gains in April. Reason: "If mill deliveries start to lengthen, people will have to come to us for the 5 ton orders they've been getting direct."

OIL COUNTRY OUTLOOK—Tubemakers who supply the oil industry believe that their customers have carried inventory liquidation as far as they dare. Major oil producers are coming back into the market—apparently because they've exhausted their stocks of material that could be traded to competitors for the popular sizes of tubing and casing. Tubemakers predict that their second quarter shipments will be 10 per cent larger than those of the first three months.

PRODUCTION HOLDS—Look for ingot production in the week ending Apr. 8 to equal the 1,620,000 tons that STEEL estimates the industry poured in the week ended Apr. 1. March output was about 7 million tons—up 12 per cent from February's 6.2 million and the largest of any month since last June.

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*Current prices were published in the March 27 issue and will appear in subsequent issues.

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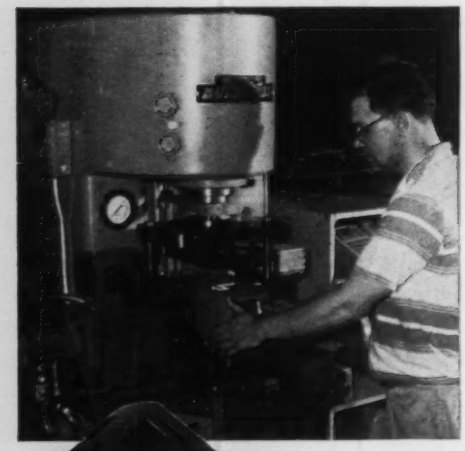
DENISON HydrOILics

16 different **VICTOR ADDING MACHINE** cases perforated without tooling changes, demonstrates **DENISON** Multipress...

VERSATILITY



PERFORATING *16 different plastic case designs without tooling changes, this 8-ton Denison Multipress reduces inventory requirements and speeds production for Victor Adding Machine Company, Chicago. Typical case after punching, shown at left.*

SHARPLY REDUCED inventory requirements, no scrap loss and production line versatility are just 3 of the important advantages gained with this Denison hydraulic Multipress at Victor Adding Machine Company.

Previously, stocks of at least 6 different basic plastic shells had to be maintained to produce cases for 16 different models in the Victor Champion line.

Now, with an 8-ton Multipress equipped with special tooling and controls which enable the operator to select a variety of punching combinations automatically, only *two* basic shells are required in stock. And *all* of the 16 different case design variations are perforated on the Multipress *with no change of tooling*. And the right shell is always on the assembly line at the right time.

Smooth, controlled hydraulic power perforates the "Cycolac" plastic, without charring or discoloring. Holes are clean and smooth . . . there's no scrap loss . . . punch life is significantly longer. This operation at Victor Adding Machine is another case-in-point showing how Multipress versatility and usefulness can save time and money in *your* plant. Call in the nearby Denison Production Specialist to discuss how a **M**ultipress **A**nalysis **P**rogram can start to **MAP** production savings for you now.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
1180 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

DENISON
HYDRAULIC MULTIPRESS

STEEL
QUARTERLY SURVEY

COMPONENTS	CURRENT INVENTORIES					2nd Quarter FORECAST		
	UNDER 10 DAYS	10-30 DAYS	30-60 DAYS	60-90 DAYS	3-6 MONTHS	LOWER	SAME	HIGHER
CASTINGS . . . . . Die, gray iron, malleable, nonferrous, steel.	2%	23%	56%	14%	5%	20%	62%	18%
OTHER FORMED COMPONENTS . . . . Forgings, stampings, springs, wire shapes.	1%	20%	51%	18%	10%	14%	70%	16%
MACHINED COMPONENTS . . . . . Bearings, couplings, cylinders, gears, screw machine products.	4%	21%	42%	25%	8%	18%	68%	14%
ELECTRICAL EQUIPMENT, MOTORS . .	9%	22%	43%	14%	12%	19%	73%	8%
FASTENERS	5%	32%	40%	12%	11%	15%	78%	7%
MECHANICAL RUBBER GOODS, BELTING	9%	23%	50%	17%	1%	15%	78%	7%

FIGURES are percentages of respondents to STEEL's quarterly survey. UNDERSCORED figures show how most respondents reported.

Component Buyers Take It Easy

Quick deliveries keep stocks on short side. Respondents to STEEL's quarterly survey show little intention of buying heavily in the second quarter

RESPONDENTS to STEEL's quarterly survey of component buyers don't expect a big upsurge in their purchasing during the second quarter. In fact, some reductions appear imminent.

Quick deliveries have dulled the incentive to build reserves and have prompted close scrutiny of inventory policies by many buyers. Result: Hand-to-mouth policies have become popular.

Another factor: The slow pace of general business so far this year may have caused a downward readjustment of second quarter purchasing goals.

• **How They Stand**—The inventory position of STEEL's respondents is somewhat longer than it was the first of the year: 27 per cent are under 30 days; 48 per cent are in the 30-to-60 day period; and 25 per cent are in the over 60 days category. Last quarter, 36 per cent were reported under 30 days and 21 per cent over 60 days.

However, in the last survey, the number of purchasing agents planning to build inventories just about equaled the number expecting to continue reductions (18 per cent vs. 19 per cent). Now the fair wind has eased. Although those saying they'll reduce reserves in the second quarter fell to 17 per cent, only 13 per cent believe they'll be adding to stockpiles.

Some consolation might be found in the fact that inventory building has tapered off in the second quarter, the last three years. And the increase in respondents planning to stand pat may signify stability.

• **How They Shifted**—Except for rubber goods and belting, all reserves showed an increase in the 90-day-and-over period. Except for fasteners, which showed no change, all categories had an upturn in the 30-to-60-day level and a decline in the 10-to-30-day period. Activity in the under 10 and 60-to-90-day categories was mixed.

While the trend points to a leveling or lowering of stocks in the second quarter, 19 per cent of the purchasing agents polled claim their inventories are lower than they expected them to be at this time. Only 11 per cent say they're higher.

The purchasing agent of an Eastern electrical firm states: "Our inventory is in excellent condition." Another Eastern buyer says his inventory is within 2 per cent of the projected level without creating bottlenecks or disrupting operations.

• **Too Much, Too Little**—An en-

couraging sign: The sharp reduction in overstocks. Oversupply mentions fell from 20 per cent in January to 9 per cent in the latest tally. But complaints about deliveries, which usually increase as business picks up, slipped 6 percentage points to 19 per cent. Bearings and electrical goods topped the list.

So buyers of parts will probably relax in the second quarter. The outlook for the quarter is on the misty side.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 126 & 127

Tightening deliveries of galvanized sheets features the light flat rolled steel market. Some producers now have little tonnage to offer for delivery under six weeks. Light construction and building repairs, as well as miscellaneous farm demands, are stimulating the movement of the coated product. Rising demand on air conditioning account also is a factor.

Along with the stretching out of galvanized sheet shipments, some revision in galvanized flat rolled prices is noted. U. S. Steel Corp. is quoting galvanized flats unchanged at $6.875 per 100 lb, but it's quoting galvannealed sheets off $2 a ton at $7.175. Also, culvert sheets are quoted $7.125 against $7.225 recently. Plain galvanized sheets, minimum spangled, are quoted $7.025. The new prices went into effect Mar. 25, and it's expected they will be met by other producers.

Demand for hot and cold rolled sheets is expanding slowly. Household appliance manufacturers have not stepped up purchases much, and automotive requirements show little change. Stampers expect some improvement in auto needs by mid-April.

Hot rolled sheets are available for shipment within two to three weeks, cold rolled in two to five weeks, depending on band stocks. Specialties, such as enameling stock and electrical sheets, can be had for shipment in three to four weeks.

Cold strip mills in New England are not building inventories of hot rolled, with deliveries running two to three weeks. Shoe shank steel (cold strip) demand is expected to improve.

Weirton Steel Div., Weirton, W. Va., National Steel Corp., booked two contracts for carbon steel sheets, 1276 tons for the Military Industrial Supply Agency. Navy, Philadelphia. One order, 505 tons, is for zinc coated stock.

Stainless Steel . . .

Stainless Steel Prices, Page 129

Inquiries for stainless steel have picked up markedly in the last few weeks, strengthening producers' hopes that consumer inventories have been cut to minimum levels.

Unfortunately, the uptrend in number of orders hasn't been accompanied by an increase in order size. Most customers are continuing to buy in small quantities, specifying rush delivery.

February sales of one producer were about 10 per cent below January's, largely because the month had fewer selling days. March sales are expected to rebound somewhat and may top January's by a narrow margin.

Higher auto sales haven't been

if a BIG saving

. . . IN STEEL ABRASIVE COSTS IS IMPORTANT TO YOU . . .

you certainly should investigate "SUPER-STEEL"
SHOT OR GRIT

★ It costs only $165.00 per ton, truck loads — considerably less than competitive steel abrasives!

★ It's unequivocally *guaranteed* to equal the performance of all higher priced steel abrasives!

★ It equals, or exceeds, "resistance-to-breakdown" ratings of higher priced steel abrasives!
(Checked on SAE-approved, Mattson-Cargill shot life testers.)

★ It's doing an excellent job of cleaning in foundries and descaling in steel and metalworking plants.
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translated into greater steel demand from automotive suppliers. As one steelmaker put it: "The demand picture can change pretty fast in this business, but we don't see any surge coming."

Mills rolling ultrathin, close tolerance stainless are relatively busier than those producing carbon cold rolled strip in New England. At least one has been cold rolling stainless near capacity.

Universal-Cyclops Steel Corp., Bridgeville, Pa., has introduced a new product, designated Uniloy 303 MA, for which it claims an eventual potential market estimated at $25 million annually. It is described as an easy-to-machine chromium-nickel stainless grade.

Tin Plate . . .

Tin Plate Prices, Page 127

Tin plate is the most active of all the major steel products—although it is a seasonal situation as canmakers prepare for the summer food pack. Volume is substantial. Some platemakers have full order books for April, and others are close to that position.

Shipments of tin plate cans in January totaled 287,597 tons vs. 345,782 in December, and 300,845 in January, 1960, reports the Census Bureau. Shipments of aluminum cans in the month were 2681 tons, up from 1800 in December and 1571 in January last year.

The movement of fruit and fruit juice cans in January was 37,031 tons vs. 45,839 in December and 50,600 in January, 1960. Vegetable and vegetable juice can shipments totaled 25,733 tons in the month against 32,614 in December and 24,011 in January, 1960. Beer can shipments amounted to 46,273 tons vs. 71,811 in December and 47,725 in January a year ago.

Steel Bars . . .

Bar Prices, Page 125

Hot carbon steel bar producers note some gains in buying by the service centers, but they report little improvement in purchases by fastener makers and cold drawers. Railroad specifications continue spotty. Demand moved sidewise in January and February and showed only faint signs of picking up in March.

Farm machinery manufacturers are buying fairly good volume, and talk of higher auto production in the second quarter is reassuring, but there's no evidence automotive requirements will be stepped up soon.

Hot bars are available for delivery in two to four weeks. Cold finished bars, which are in spotty demand, can be had for shipment from stock in some cases.

Springfield (Mass.) Armory closes Apr. 12 on barrel blanks, involving 175 tons of grade 4150 resulfurized bars. Other arsenal contracts include 211 tons of carbon rounds, placed with Jones & Laughlin Steel Corp., Pittsburgh, for the Raritan (N. J.) Arsenal. Rough forged alloy tubes for 90 mm guns were placed with Cabot Corp., Pampa, Tex., for the Watervliet (N. Y.) Arsenal at $868,951.

The Springfield Arsenal plans to add three electric hardening furnaces for the treatment of high speed steel bars and small arms parts. The Moore Drop Forging Co., Springfield, has a contract for about 135 tons of rifle barrel blanks.

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PHOSPHATE COATING
You asked **TURCO TO MAKE**

HERE'S HOW PAINTITE SCORES ON SURVEY'S 12 "MOST WANTED" FEATURES...

—Formulated as Result of Industry-Wide Survey...

During the first six months of 1959, Turco undertook an extensive survey of the phosphate coating market. Hundreds of users of these coatings were interviewed. Thousands of questions were asked. When the answers were tabulated, Turco began the task of building an iron phosphate process to the *exact specifications* called out in the survey.

The new process is now available. It is called Turco Paintite. Paintite has been thoroughly field-tested in the production lines of a dozen Turco customers. It has passed the most severe tests with flying colors. Turco is proud to announce the addition of Paintite to its ten other Turcoat phosphate and conversion coating processes that provide a better bond for organic finishing.

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2. **TEMPERATURE VERSATILITY** – Efficient anywhere within range of 140° to 180° F. Temperature control is not important.
3. **LOW FOAMING** – at any temperature within recommended range.
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5. **NO WHITE STREAKING** – Extra free rinsing. Leaves no residue.
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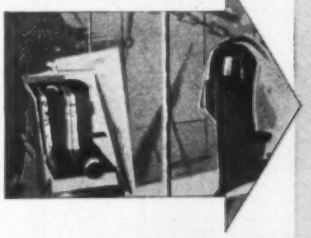
8. **USE VERSATILITY** – used by immersion, spray washer or steam cleaner.
9. **LESS SLUDGE** – less scale. Minimizes clean-up problems.
10. **RESERVE ACIDITY** – combats alkaline water conditions. Constant control not necessary.
11. **SUPERIOR SERVICE** – by Turco's vast network of technically trained servicemen, located in industrial centers throughout the world.
12. **REQUIRES ONLY 3 STAGES**–for dip or spray washing. Can be efficiently used in 5-stage operations, if desired.



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NAME
TITLE
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Wire . . .

Wire Prices, Pages 127 & 128

Seasonal improvement in demand for merchant wire products and prestressed strand is not being matched by gains in cold heading and manufacturers' wire in general.

Last year, shipments of drawn wire totaled 2,439,931 net tons, off substantially from the 2,725,598 tons moved in 1959. Prestressed strand was one of the few finished products registering a gain during the year.

Bethlehem Steel Co., Bethlehem, Pa., has reduced prices on automatic baler wire at Los Angeles (see new prices on Page 127). The new prices were made effective as of Mar. 16.

Tennessee Coal & Iron Div., Birmingham, U. S. Steel Corp., has booked an order for 3/8 in., seven wire steel strand from the U. S. Engineer, Memphis, Tenn., at $548,-230. Copperweld Steel Co., Glassport, Pa., booked 85 tons of 3/8 in., three wire stainless strand for Memphis. The largest inquiry for improved plow steel rope wire to appear in months closes Apr. 12, U. S. Army Transport Command, St. Louis.

Plates . . .

Plate Prices, Page 125

Lively inquiry for plate specialties is reportedly developing. Most of the activity centers on prospective needs of the chemical and food processing industries. Also, to some extent, defense requirements are reflected.

Buying of plates is far from brisk, though March bookings were up 5 per cent from those in February. Orders are increasing in number but not in aggregate volume, indicating many users have depleted their inventories and are buying hand to mouth.

Sheared carbon plates are readily available for shipment in ten days to two weeks. Flange and head work can be turned out in four weeks on the average.

Bids closed Mar. 28 on 4730 tons of hull plates for Naval shipyards. The bulk of the tonnage will be placed through the Philadelphia Naval procurement agency.

Tubular Goods . . .

Tubular Goods Prices, Page 129

Producers of oil country goods report prospects are encouraging. January bookings at some mills were up 25 per cent from December's, the best they have been since last April. February sales dipped slightly in the aggregate (because of fewer days) but held up well on a daily average basis. March bookings are expected to show a snapback equal to January's.

A sales executive just returned from the Southwest says downriver stocks of distributors are shrinking. Major oil companies are coming back into the market. They've all but exhausted their stocks. Some oil producers have placed steel orders for the second quarter—a highly unusual procedure after months of hand-to-mouth buying.

During the last month, Lone Star Steel Co. placed both its electric-weld pipe mills on three shift operations. Its cast iron pipe foundry is also increasing its operations from four to five days a week.

Tubemakers are predicting that their second quarter shipments will

RA 330® brings the space age **CLOSER**

RA 330 supports rocket cases in pit furnace 10 ft. diameter by 30 ft. deep.

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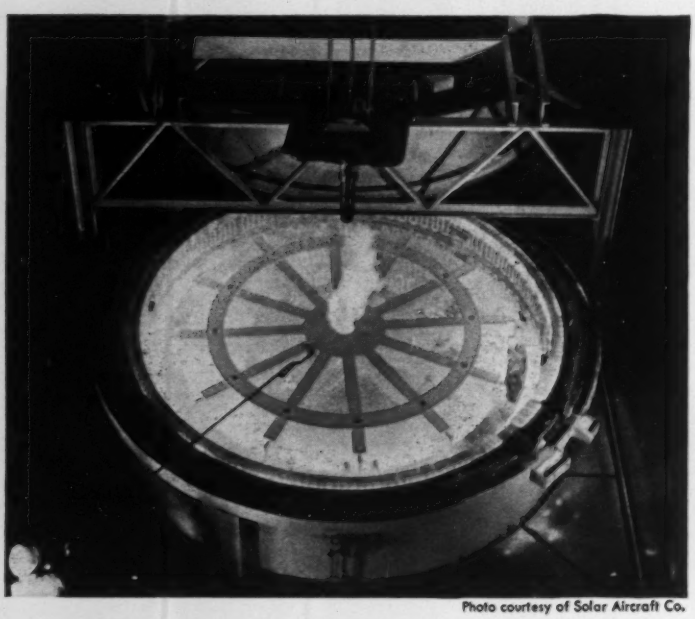

Photo courtesy of Solar Aircraft Co.

Based upon highly successful use of RA 330 in other applications with temperatures ranging up to 2250° F., Solar Aircraft Company selected RA 330 for this critical application.

For best performance specify RA 330 for your heat treating fixtures and furnace parts.

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be 10 per cent larger than those in the first three months of this year.

The number of rotary rigs in operation in the U. S. and Canada increased by 41 in the latest weekly survey by the Hughes Tool Co. The U. S. had 1656 active rigs, up 53; Canada had 178, down 12.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 126

Seasonal improvement in demand for concrete steel reinforcing bars is expected to result in a further extension of deliveries this month. Tonnage is being estimated for bridges, buildings, and many engineering projects.

One weak factor in the situation is the weakness in fabricators' prices. It is resulting in unbalanced backlogs; some shops are holding much larger tonnage than others. Contractors are holding prices for bars in place at levels that assure some profit.

Scrap Use in January Largest Since October

Steel mills and foundries consumed an estimated 1,599,000 gross tons of ferrous scrap during January, reports the Institute of Scrap Iron & Steel Inc., Washington. That total compares with consumption of 1,465,000 tons in December, and is the largest monthly consumption since October, last year.

Licensing of scrap for export during February declined to 509,000 tons from 705,000 in January. Exports during January were 507,000 tons.

Structural Shipments Up In Jan.-Feb. Period

Shipments of fabricated structural steel in the first two months of 1961 totaled 461,758 tons, 3 per cent better than in the like period of 1960, reports the American Institute of Steel Construction. February shipments were 230,228 tons, about the same as in January, but some 10,000 tons below the movement in February, 1960.

The fabricated structural steel industry booked 227,317 tons in February, a drop of 16 per cent from January. Total bookings for the first two months of the year were 499,494 tons, down 2 per cent from the like period last year.

Industry backlog as of Feb. 28 was 2,086,156 tons. Of that total, 55 per cent (1,140,062 tons) is scheduled for fabrication during the four months ending June 30, 1961.

Structural Shapes . . .

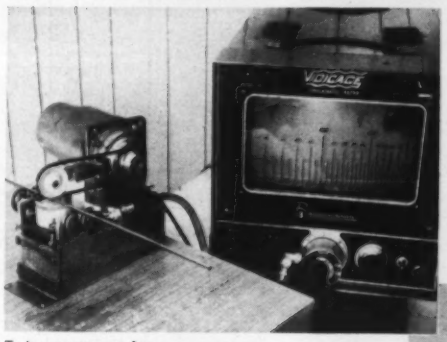
Structural Shape Prices, Page 125

While structural fabricators report activity is better, it's still spotty and confined mostly to small orders, largely of public character. Competition is strong among the fabricating shops.

March bookings of structural steel were larger than in any previous month this year. The number of orders has been increasing more rapidly than aggregate tonnage, indicating that fabricators are buying close to needs. Producers look for the uptrend to continue this month as construction activity quickens seasonally. The structural mills are running about 12 turns weekly vs. 18 normally. Wide flange beams

ANOTHER ULTRASONIC FIRST...

THICKNESS GAGING WITHOUT CONTACT



Tube scanner for VIDIGAGE® thickness gaging without contact.

Thickness gaging by means of the ultrasonic resonance technique can now be accomplished by immersion without contact. This is extremely advantageous because:

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When the water column is of sufficient length the VIDIGAGE® does not respond to the water resonances. As a result the resonance thickness of the work piece can be detected by itself on the VIDIGAGE screen.
In order to take full advantage of this immersion system, the VIDIGAGE had to be modified. The modified VIDIGAGE then surpassed all expectations, especially in the gaging of small diameter, high accuracy tubing.

This development is another in the long line of BRANSON engineering breakthroughs, which enables industry to solve its problems by means of ultrasonic testing. The next time you have a testing problem call BRANSON and see how fast BRANSON will find the best solution in the shortest possible time.

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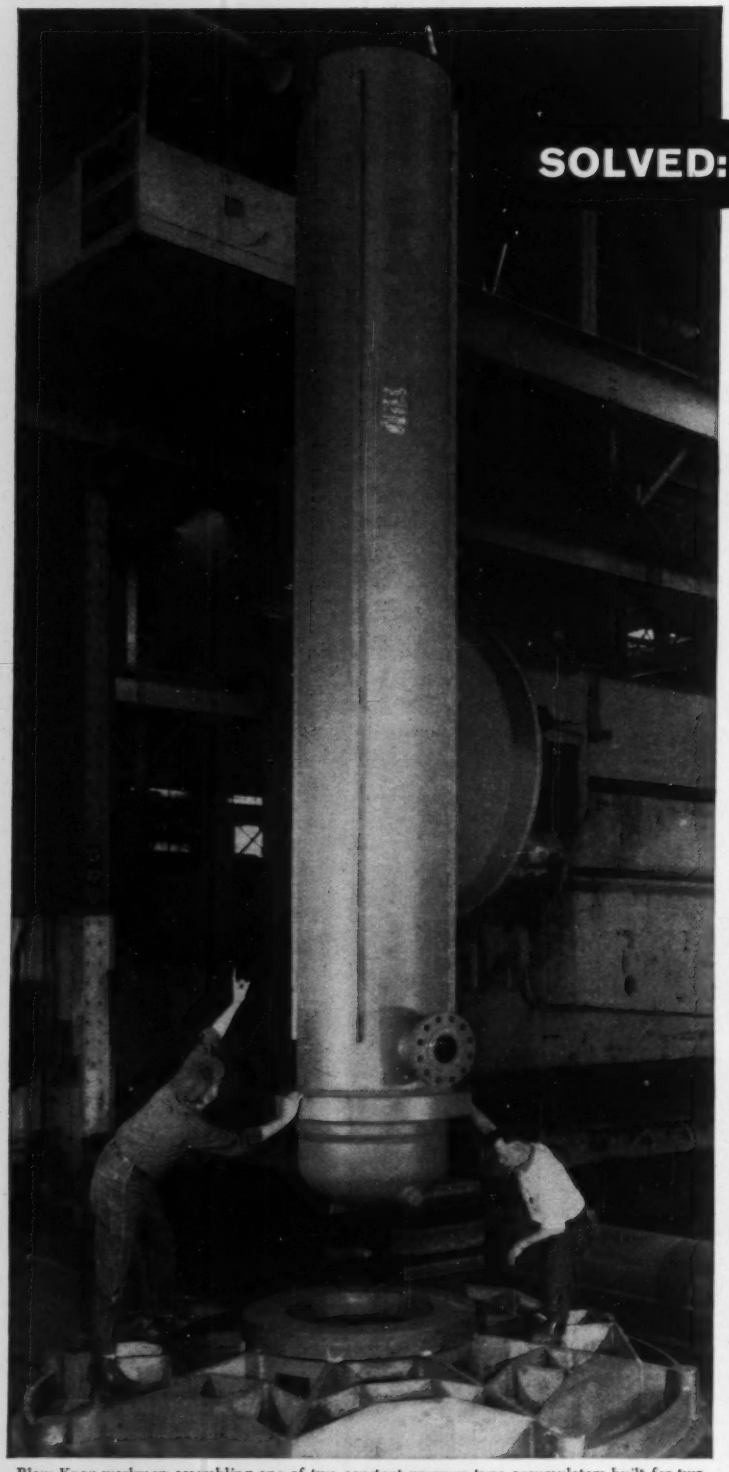

Blaw-Knox workmen assembling one of two constant pressure type accumulators built for two of America's largest steel mills. Sandusky supplied the straight cylindrical sections for both.

SOLVED: by Sandusky Centrifugal Casting

Blaw-Knox chooses 10-ton

SANDUSKY CASTING

for giant slabbing mill

When an 18½-foot cylinder was needed for a new giant Universal slabbing mill built by Blaw-Knox Company's East Chicago (Indiana) Works for a well known steel mill, they found that the most practical and economical way to meet all requirements was with a Sandusky Centrifugal Casting.

This 10-ton carbon steel cylinder, 32" O.D. with a 3½" wall, functions as an accumulator in the mill's hydraulic roll balancing system. Essentially a pressure vessel, it simultaneously supports the ram and ballast weighing 226 tons—the weight required to develop constant operating pressure of 1000 p.s.i.

"Only a dimensionally stable, one-piece cylinder could perform satisfactorily in this service," a Blaw-Knox official asserted. *"Distortion could lead to binding, loss of pressure and costly downtime. Sandusky's ability to produce this heavy walled cylinder in one 18½ foot length met all our requirements of cost, stability, and strength."*

Sandusky cylinders up to 33 feet long —from 7" to 54" O.D.— and in a wide range of ferrous and non-ferrous alloys —may well be the answer to *your cylindrical problems,* too.

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SANDUSKY, OHIO—Stainless, Carbon, Low-Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys

are in better demand than standard structurals. Plain material deliveries range two to four weeks.

Nearly 7000 tons of structurals are involved in three Oregon projects: 3000 tons for an insurance building, 4000 tons for two highway spans. Work is expected to be resumed on the Prudential Insurance project in Boston. Work on 20,000 tons for this project has been held up all winter.

Pig Iron . . .

Pig Iron Prices, Page 130

Inquiry for merchant pig iron is reported quickening slightly at some points, but, in general, market conditions are little changed from those prevailing the last several weeks. At Buffalo, a little interest is developing in iron for shipment by vessel to upper lake ports when the navigation season opens.

Merchant iron producers continue to operate at sharply reduced rates, most needs of customers being taken care of from inventories. Demand for oil field and roadbuilding equipment pushed up the March foundry melt on the Pacific coast by 5 to 15 per cent, and melters in the area are operating at 40 to 60 per cent of capacity.

Iron ore . . .

Iron Ore Prices, Page 131

Although steel production in Canada and the U. S. declined last year, output of high grade iron concentrates at the Hilton Mines, in which Steel Co. of Canada holds a 50 per cent interest, climbed 22 per cent. Production of the mines, 40 miles northwest of Hull, Que., was 700,000 tons of concentrates vs. 573,000 tons in 1959.

The increase was made possible by a mill expansion program which increased capacity from 600,000 to 800,000 tons.

About 50 per cent of output from the mines is shipped to Stelco, the remainder to the U. S. The deposit was mined during the 1870s, but was later abandoned. Interest in it was revived in 1951 when the success attending beneficiation of low grade ores in Minnesota indicated that the Ottawa Valley ore might be concentrated into high grade pellets at the mine site.

Service Center Shipments Rising

March sales were best for any month since third quarter of '60. Pickup reflects depletion of consumer stocks. Distributors improving their inventories

Prices, Page 130

STEEL SERVICE CENTER shipments in the first quarter will be close to 10 per cent over the tonnage moved in the fourth quarter of 1960, a Steel Service Center Institute survey shows.

"March sales, calculated on an average daily basis, were better than for any month since the third quarter of last year," said Robert G. Welch, executive vice president. "Although sales are moderate, the turnaround in shipments is encouraging."

• **Stocks Depleted**—The executive committee reported industry shipments declined steadily throughout 1960, reaching a low point in December. A recent increase in shipments on the West Coast was above that shown for the nation.

The improvement in business is primarily due to inventory depletion by metal consumers, says Mr. Welch, who points out that many users have re-entered the market for the first time in months and that substantial quantities of surplus items have just about disappeared.

Mr. Welch reported the service centers are processing an extremely large number of orders, but the average order size remains small, indicating hand-to-mouth buying.

• **Distributors Order** — Inventories of industrial steel products held by the service centers held unchanged during March at 2,850,000 net tons. This is the first time since last summer, when inventories stood at 3,800,000 tons, that there has not been a reduction in service center stocks, indicating the distributors have been increasing their purchases from the mills in recent weeks.

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Steelmaking Is Creeping Upward at Sluggish Pace

STEELMAKING operations are edging upward slowly, spurred largely by seasonal improvements in construction. April orders appear to be running a little ahead of those booked in March.

STEEL estimates ingot production this week (ended Apr. 1) will top by several thousand tons the 1,611,000 tons officially reported produced in the week ended Mar. 25. Output is now at the highest weekly rate since the week ended June 25, 1960, but most steelmakers are disappointed at the rate of upturn. They expected it would be much faster by this time.

• **Pittsburgh**—Operations are edging upward slowly in this area. Expectations are the district ingot rate will rise about 1 point this week. Output in the latest week of record was 318,804 net tons.

• **Chicago**—In the face of a small improvement in steel demand, additional steelmaking furnaces are scheduled for activity, and the district ingot rate should rise to about 63 per cent, based on the 1960 capacity rating.

• **Philadelphia**—Steadiness in steel output is indicated for this week, with the district index around 89 (237,804 tons), a level that has held for the last two weeks.

• **Buffalo**—District steelmen don't expect any real recovery in the area production rate until the automakers start entering large orders on mill books. Weekly output recently has been in the neighborhood of 64,000 tons, and not much change from that level is indicated soon.

• **Youngstown** — Major steel mills here are operating at an estimated 33 per cent (based on 1960 capacity). That compares with 39 per cent a week ago. The lower rate reflects suspension of steelmaking at Youngstown Sheet & Tube's Brier Hill Works for a changeover of the blooming mill. Output in the latest week of record (ended Mar. 25) was 120,687 tons, which compared with 107,088 tons the week before.

• **Cleveland**—Area steelmakers are disappointed by the slow pace of demand. Ingot operations continue in a narrow range from week to week, with output ranging from 62,000 to 65,000 tons. Production in the latest week of record was 64,891 tons.

• **Detroit**—With the mills reporting small order increases, ingot production here is moving up slightly. Two mills are adding about 4000 tons weekly to output, and the district rate is estimated at 92 per cent on the basis of 1960 capacity. Part of the increase stems from more auto activity.

• **Cincinnati**—Area ingot production for the week ended Apr. 1 is forecast at 63,295 tons, equal to roughly 55 per cent of 1960 capacity. Production was at the rate of 66,215 tons the preceding week, which in turn was down 3000 tons from the week before that. Open hearth furnace difficulties by one producer are given as the cause of the decline in output.

• **Birmingham**—The ingot rate for this district is estimated at 57.4 per cent of capacity.

• **Los Angeles**—Production by western mills in the latest week of record is estimated at 126,265 tons, up slightly from the 121,589 reported for the week preceding. Lone Star Steel Co. in Texas is increasing production.

Rails, Cars . . .

Track Material Prices, Page 128

Freight car orders increased slightly in February, amounting to 1536 cars vs. 1339 in January, reports the American Railway Car Institute and the Association of American Railroads. In February, 1960, orders totaled 3211 cars.

Deliveries totaled 1958 cars in February, a decline from the 3515 in January and 5052 in February last year.

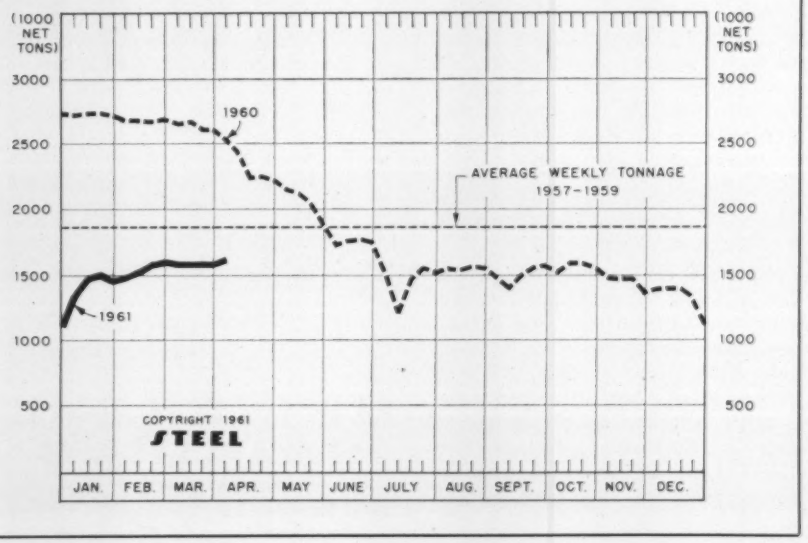
Backlogs as of Mar. 1 showed 13,760 cars on order in railroad shops and 4469 in commercial shops, a total of 18,229. That compares with 18,894 cars on order on Feb. 1 and 46,323 on Mar. 1 last year.

STEEL INGOT PRODUCTION

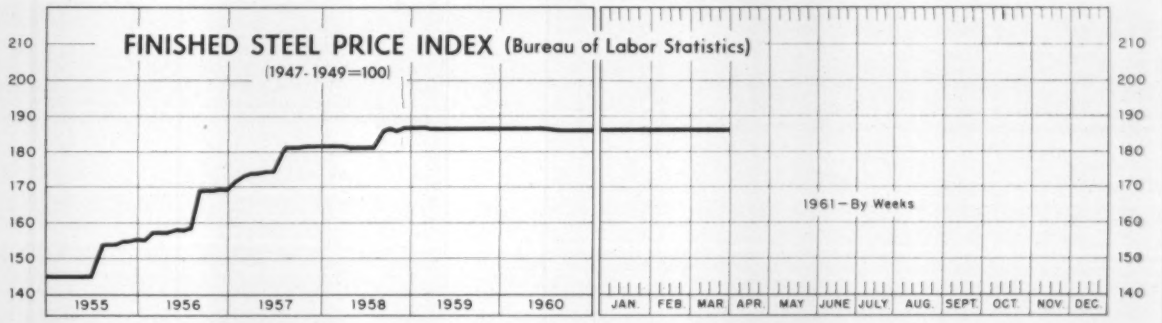
Weeks Ended	Net Tons	Change
Apr. 1	1,620,000*	+ 0.06%
Mar. 25	1,611,000	+ 2.4%
Mar. 18	1,574,000	+ 0.1%
Totals to Mar. 25		
1961	18,326,000	−43.0%
1960	32,123,000	

DISTRICTS	Week Ended Mar. 25 Tons‡	Week Ended Mar. 25 Index†	Week Ended Mar. 18 Index†
Northeastern	237,804	89	89
Buffalo	64,254	66	67
Pittsburgh	318,804	79	77
Youngstown	120,687	71	63
Cleveland	64,891	70	67
Detroit	96,524	92	90
Chicago	351,631	94	93
Cincinnati	65,602	87	89
St. Louis	54,655	104	101
Southern	108,396	100	93
Western	126,265	108	108
Industry	1,611,000	86.5	84.5

*Estimated by STEEL. †1957-59=100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Mar. 28, 1961	Week Ago	Month Ago	Feb. Index	Year Ago
186.2	**186.2**	**186.2**	**186.2**	**186.8**

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 28

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.489
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.809
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Mar. 29 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	209.10
Index in cents per lb	6.713	6.713	6.713	6.713	5.665

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.02
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	59.42
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.93
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	60.55
Steelmaking Scrap, GT	38.67	38.67	35.67	33.33	53.50

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Mar. 29 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

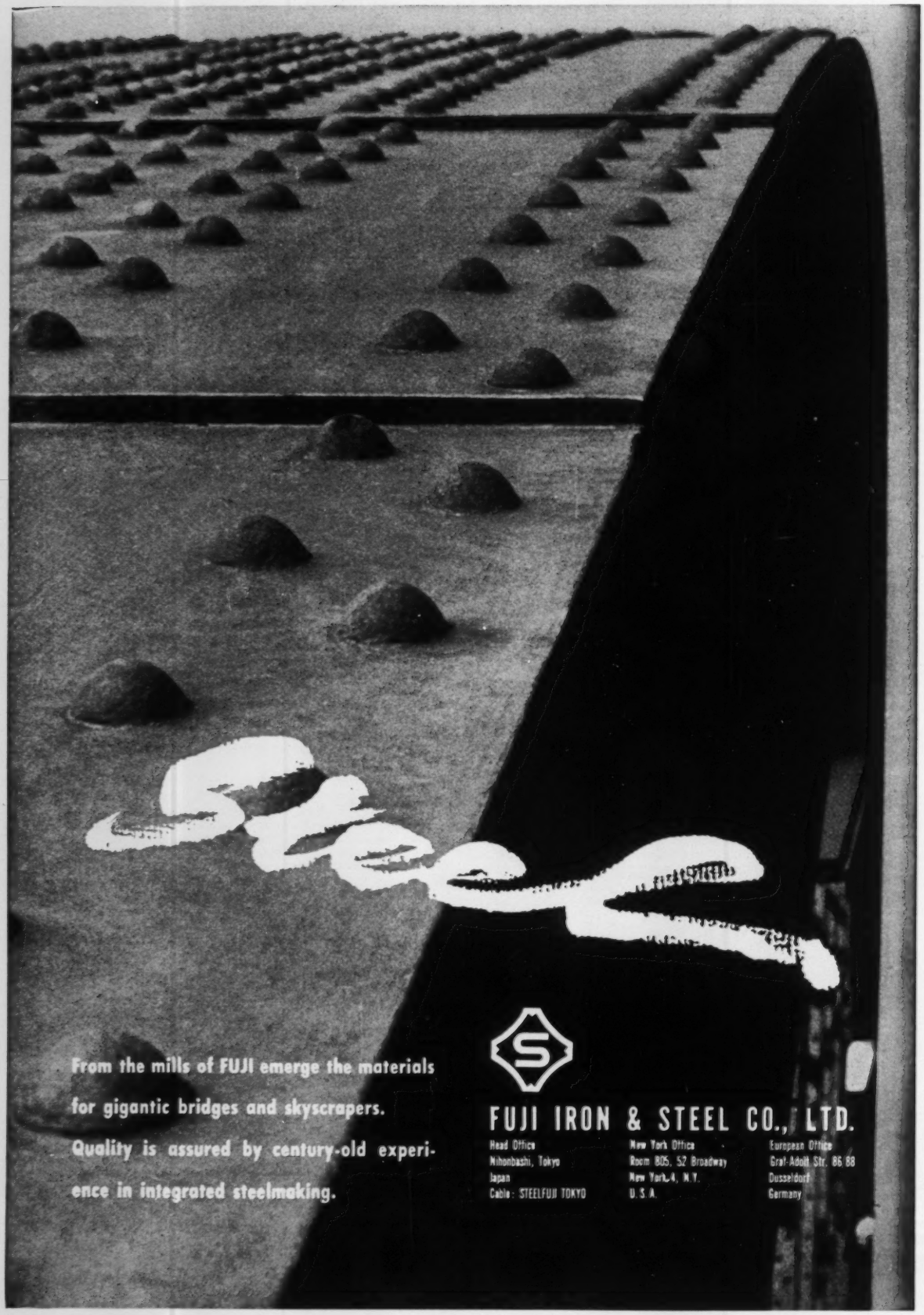
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	Mar. 29 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$61.00
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	63.75
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	64.26
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	60.50
Ferromanganese, net tonst†	245.00	245.00	245.00	245.00	205.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$34.50	$34.50	$34.50	$34.50	$53.50
No. 1 Heavy Melt, E. Pa.	43.00	43.00	39.00	35.00	53.50
No. 1 Heavy Melt, Chicago	38.50	38.50	33.50	31.50	53.50
No. 1 Heavy Melt, Valley	38.50	36.50	36.50	36.50	57.50
No. 1 Heavy Melt, Cleve.	35.50	33.50	33.50	33.50	54.50
No. 1 Heavy Melt, Buffalo	29.50	29.50	27.50	31.50	50.50
Rails, Rerolling, Chicago	61.50	60.50	56.50	53.50	72.50
No. 1 Cast, Chicago	44.50	44.50	42.50	45.50	48.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.00



From the mills of FUJI emerge the materials for gigantic bridges and skyscrapers. Quality is assured by century-old experience in integrated steelmaking.

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New York 4, N.Y.
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Germany

Steel Prices

Mill prices as reported to STEEL, Mar. 29, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 126; footnotes, page 128.

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall, Pa. U5 ....$76.00

INGOT, Alloy (NT)
Detroit S41 ....$82.00
Economy, Pa. B14 ....82.00
Farrell, Pa. S3 ....82.00
Lowellville, O. S3 ....82.00
Midland, Pa. C18 ....82.00
Munhall, Pa. U5 ....82.00
Sharon, Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonvil'e, Ill. K4 ....$82.00
Bessemer, Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton, Pa. U5 ....80.00
Ensley, Ala. T2 ....80.00
Fairfield, Ala. T2 ....80.00
Fontana, Calif. K1 ....90.50
Gary, Ind. U5 ....80.00
Johnstown, Pa. B2 ....80.00
Lackawanna, N.Y. B2 ..80.00
Munhall, Pa. U5 ....80.00
Owensboro, Ky. G8 ....80.00
S. Chicago, Ill. R2, U5 ..80.00
S. Duquesne, Pa. U5 ....80.00
Sterling, Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer, Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton, O. R2 ....102.00
Clairton, Pa. U5 ....99.50
Conshohocken, Pa. A3 .104.50
Ensley, Ala. T2 ....99.50
Fairfield, Ala. T2 ....99.50
Farrell, Pa. S3 ....99.50
Fontana, Calif. K1 ....109.00
Gary, Ind. U5 ....99.50
Geneva, Utah C11 ....99.50
Houston S5 ....104.50
Johnstown, Pa. B2 ....99.50
Lackawanna, N.Y. B2 ..99.50
Los Angeles B3 ....109.00
Midland, Pa. C18 ....99.50
Munhall, Pa. U5 ....99.50
Owensboro, Ky. C8 ....99.50
Seattle B3 ....109.00
Sharon, Pa. S3 ....99.50
S. Chicago R2, U5, W14 ..99.50
S. Duquesne, Pa. U5 ....99.50
S. San Francisco B3 ....109.00
Warren, O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem, Pa. B2 ....$119.00
Bridgeport, Conn. C32 ..119.00
Buffalo R2 ....119.00
Canton, O. R2, T7 ....119.00
Conshohockn, Pa. A3 ..126.00
Detroit S41 ....119.00
Economy, Pa. B14 ....119.00
Farrell, Pa. S3 ....119.00
Fontana, Calif. K1 ....140.00
Gary, Ind. U5 ....119.00
Houston S5 ....124.00
Ind. Harbor, Ind. Y1 ..119.00
Johnstown, Pa. B2 ....119.00
Lackawanna, N.Y. B2 ..119.00
Los Angeles B3 ....139.00
Lowellville, O. S3 ....119.00
Massillon, O. R2 ....119.00
Midland, Pa. C18 ....119.00
Munhall, Pa. U5 ....119.00
Owensboro, Ky. G8 ....119.00
Seattle (6) B3 ....140.00
Sharon, Pa. S3 ....119.00
S. Chicago R2, U5, W14 ..119.00
S. Duquesne, Pa. U5 ..119.00
Struthers, O. Y1 ....119.00
Warren, O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton, O. R2 ....125.00
Cleveland R2 ....122.50
Gary, Ind. U5 ....122.50
S. Chicago, Ill. R2, W14 .122.50
S. Duquesne, Pa. U5 ...122.50
Warren, O. C17 ....122.50

SKELP
Aliquippa, Pa. J5 ....5.05
Benwood, W.Va. W10 ....5.05
Ind. Harbor, Ind. Y1 ....5.05
Munhall, Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren, O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
Alabama City, Ala. R2 ...6.40
Aliquippa, Pa. J5 ....6.40
Alton, Ill. L1 ....6.60
Bartonville, Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora, Pa. A7 ....6.40
Fairfield, Ala. T2 ....6.40
Houston S5 ....6.65
Indiana Harbor, Ind. Y1 .6.40
Johnstown, Pa. B2 ....6.40
Joliet, Ill. A7 ....6.40
Kansas City, Mo. S5 ....6.65
Kokomo, Ind. C16 ....6.50
Los Angeles B3 ....7.20
Minnequa, Colo. C10 ....6.65
Monessen, Pa. P7 ....6.40
Pittsburg, Calif. C11 ....7.20
Portsmouth, O. P12 ....6.40
Roebling, N.J. R5 ....6.50
S. Chicago, Ill. R2, W14 ..6.40
Sparrows Point, Md. B2 ..6.50
Sterling, Ill. (1) N15 ....6.40
Sterling, Ill. N15 ....6.50
Struthers, O. Y1 ....6.40
Worcester, Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
Alabama City, Ala. R2 ...5.50
Aliquippa, Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer, Ala. T2 ....5.50
Bethlehem, Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton, Pa. U5 ....5.50
Fairfield, Ala. T2 ....5.50
Fontana, Calif. K1 ....6.30
Gary, Ind. U5 ....5.50
Geneva, Utah C11 ....5.50
Houston S5 ....5.60
Ind. Harbor, Ind. I-2, Y1 .5.50
Johnstown, Pa. B2 ....5.55
Joliet, Ill. P22 ....5.50
Kansas City, Mo. S5 ....5.60
Lackawanna, N.Y. B2 ..5.55
Los Angeles B3 ....6.20
Minnequa, Colo. C10 ....5.80
Munhall, Pa. U5 ....5.50
Niles, Calif. P1 ....6.25
Phoenixville, Pa. P4 ....5.55
Portland, Oreg. O4 ....6.25
Seattle B3 ....6.25
S. Chicago, Ill. U5, W14 .5.50
S. San Francisco B3 ....6.15
Sterling, Ill. N15 ....5.50
Struthers, O. Y1 ....5.50
Torrance, Calif. C11 ....6.20
Weirton, W.Va. W6 ....5.50

Wide Flange
Bethlehem, Pa. B2 ....5.55
Clairton, Pa. U5 ....5.50
Fontana, Calif. K1 ....6.45
Indiana Harbor, Ind. I-2 ..5.50
Lackawanna, N.Y. B2 ..5.55
Munhall, Pa. U5 ....5.50
Phoenixville, Pa. P4 ....5.55
S. Chicago, Ill. U5 ....5.50
Sterling, Ill. N15 ....5.50
Weirton, W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa, Pa. J5 ....6.80
Clairton, Pa. U5 ....6.80
Gary, Ind. U5 ....6.80
Houston S5 ....6.90
Munhall, Pa. U5 ....6.80
S. Chicago, Ill. U5, W14 ..6.80

H.S., L.A., Std. Shapes
Aliquippa, Pa. J5 ....8.05
Bessemer, Ala. T2 ....8.05
Bethlehem, Pa. B2 ....8.10
Clairton, Pa. U5 ....8.05
Fairfield, Ala. T2 ....8.05
Fontana, Calif. K1 ....8.85
Gary, Ind. U5 ....8.05
Geneva, Utah C11 ....8.05
Houston S5 ....8.15
Ind. Harbor, Ind. I-2, Y1 .8.05
Johnstown, Pa. B2 ....8.10
Kansas City, Mo. S5 ....8.15
Lackawanna, N.Y. B2 ...8.10
Los Angeles B3 ....8.75
Munhall, Pa. U5 ....8.05
Phoenixville, Pa. P4 ....8.10
Seattle B3 ....8.80
S. Chicago, Ill. U5, W14 ..8.05
S. San Francisco B3 ....8.70
Sterling, Ill. N15 ....7.75
Struthers, O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem, Pa. B2 ....8.10
Ind. Harbor, Ind. I-2 ....8.05
Lackawanna, N.Y. B2 ...8.10
Munhall, Pa. U5 ....8.05
S. Chicago, Ill. U5 ....8.05
Sterling, Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem, Pa. B2 ....5.55
Ind. Harbor, Ind. I-2 ....5.50
Lackawanna, N.Y. B2 ..5.55
Munhall, Pa. U5 ....5.50
S. Chicago, Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind. Harbor, Ind. I-2 ....6.50
Lackawanna, N.Y. B2 ..6.50
Munhall, Pa. U5 ....6.50
S. Chicago, Ill. I-2, U5 ...6.50
Weirton, W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
Alabama City, Ala. R2 ...5.30
Aliquippa, Pa. J5 ....5.30
Ashland, Ky. (15) A10 ...5.30
Atlanta A11 ....5.50
Bessemer, Ala. T2 ....5.30
Clairton, Pa. U5 ....5.30
Claymont, Del. P4 ....5.30
Cleveland J5, R2 ....5.30
Coatesville, Pa. L7 ....5.30
Conshohocken, Pa. A3 ...5.30
Ecorse, Mich. G5 ....5.30
Fairfield, Ala. T2 ....5.30
Farrell, Pa. S3 ....5.30
Fontana, Calif. (30) K1 ..6.10
Gary, Ind. U5 ....5.30
Geneva, Utah C11 ....5.30
Granite City, Ill. G4 ....5.40
Houston S5 ....5.40
Ind. Harbor, Ind. I-2, Y1 .5.30
Johnstown, Pa. B2 ....5.30
Lackawanna, N.Y. B2 ..5.30
Mansfield, O. E6 ....5.30
Minnequa, Colo. C10 ....6.15
Munhall, Pa. U5 ....5.30
Newport, Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale, Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon, Pa. S3 ....5.30
S. Chicago, Ill. U5, W14 ..5.30
Sparrows Point, Md. B2 ..5.30
Sterling, Ill. N15 ....5.30
Steubenville, O. W10 ....5.30
Warren, O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown (27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont, Del. P4 ....7.05
Fontana, Calif. K1 ....7.85
Geneva, Utah C11 ....7.05
Houston S5 ....7.15
Johnstown, Pa. B2 ....7.05
Sparrows Point, Md. B2 ..7.05

PLATES, Wrought Iron
Economy, Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa, Pa. J5 ....7.95
Ashland, Ky. A10 ....7.95
Bessemer, Ala. T2 ....7.95
Clairton, Pa. U5 ....7.95
Claymont, Del. P4 ....7.95
Cleveland J5, R2 ....7.95
Coatesville, Pa. L7 ....7.95
Conshohocken, Pa. A3 ...7.95
Economy, Pa. B14 ....7.95
Ecorse, Mich. G5 ....7.95
Fairfield, Ala. T2 ....7.95
Farrell, Pa. S3 ....7.95
Fontana, Calif. (30) K1 ..8.75
Gary, Ind. U5 ....7.95
Geneva, Utah C11 ....7.95
Houston S5 ....8.05
Ind. Harbor, Ind. I-2, Y1 .7.95
Johnstown, Pa. B2 ....7.95
Munhall, Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon, Pa. S3 ....7.95
S. Chicago, Ill. U5, W14 ..7.95
Sparrows Point, Md. B2 ..7.95
Sterling, Ill. N15 ....7.625
Warren, O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa, Pa. J5 ....7.50
Claymont, Del. P4 ....7.50
Coatesville, Pa. L7 ....7.50
Economy, Pa. B14 ....7.50
Farrell, Pa. S3 ....7.50
Fontana, Calif. K1 ....8.30
Gary, Ind. U5 ....7.50
Houston S5 ....7.60
Ind. Harbor, Ind. Y1 ....7.50
Johnstown, Pa. B2 ....7.50
Lowellville, O. S3 ....7.50
Munhall, Pa. U5 ....7.50
Newport, Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon, Pa. S3 ....7.50
S. Chicago, Ill. U5, W14 ..7.50
Sparrows Point, Md. B2 ..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Claymont, Del. P4 ....6.375
Conshohocken, Pa. A3 ...6.375
Ind. Harbor, Ind. I-2 ....6.375
Munhall, Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S. Chicago, Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10 ...5.55
Ashland l.c.l. (15) A10 ...6.05
Cleveland c.l. R2 ....6.05
Warren, O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala. City, Ala. (9) R2 ...5.675
Aliquippa, Pa. (9) J5 ...5.675
Alton, Ill. L1 ....5.875
Atlanta (9) A11 ....5.875
Bessemer, Ala. (9) T2 ...5.675
Birmingham (9) C15 ...5.675
Buffalo (9) R2 ....5.675
Canton, O. (23) R2 ....6.15
Clairton, Pa. (9) U5 ....5.675
Cleveland (9) R2 ....5.675
Ecorse, Mich. (9) G5 ...5.675
Emeryville, Calif. J7 ...6.425
Fairfield, Ala. (9) T2 ...5.675
Fairless, Pa. (9) U5 ...5.825
Fontana, Calif. (9) K1 ...6.375
Gary, Ind. (9) U5 ....5.675
Houston (9) S5 ....5.925
Ind. Harbor (9) I-2, Y1 ..5.675
Johnstown, Pa. (9) B2 ...5.675
Joliet, Ill. P2 ....5.675
Kansas City, Mo. (9) S5 ..5.925
Lackawanna (9) B2 ....5.675
Los Angeles (9) B3 ....6.375
Massillon, O. (23) R2 ....6.15
Midland, Pa. (23) C18 ....6.025
Milton, Pa. M18 ....5.825
Minnequa, Colo. C10 ....6.125
Niles, Calif. P1 ....6.375
Owensboro, Ky. (9) G8 ...6.025
Pittsburg, Calif. (9) C11 .6.375
Pittsburgh (9) J5 ....5.675
Portland, Oreg. O4 ....6.425
Riverdale, Ill. (9) A1 ...5.675
Seattle (9) A24, B3, N15 .6.425
S. Ch'c'go (9) R2, U5, W14 5.675
S. Duquesne, Pa. (9) U5 ..5.675
S. San Fran., Calif. (9) B3 6.425
Sterling, Ill. (1) (9) N15 ..5.675
Sterling, Ill. (9) N15 ....5.775
Struthers, O. (9) Y1 ....5.675
Tonawanda, N.Y. B12 ...5.675
Torrance, Calif. (9) C11 .6.375
Warren, O. C17 ....6.025
Youngstown (9) R2, U5 ..5.675

BARS, Hot-Rolled Alloy
Aliquippa, Pa. J5 ....6.725
Bethlehem, Pa. B2 ....6.725
Bridgeport, Conn. C32 ...6.80
Buffalo R2 ....6.725
Canton, O. R2, T7 ....6.725
Clairton, Pa. U5 ....6.725
Detroit S41 ....6.725
Economy, Pa. B14 ....6.725
Ecorse, Mich. G5 ....6.725
Farrell, Pa. S3 ....6.725
Fontana, Calif. K1 ....7.775
Gary, Ind. U5 ....6.725
Houston S5 ....6.975
Ind. Harbor, Ind. I-2, Y1 .6.725
Johnstown, Pa. B2 ....6.725
Kansas City, Mo. S5 ....6.975
Lackawanna, N.Y. B2 ..6.725
Los Angeles B3 ....7.775
Lowellville, O. S3 ....6.725
Massillon, O. R2 ....6.725
Midland, Pa. C18 ....6.725
Owensboro, Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Seattle (6) B3 ....7.825
Sharon, Pa. S3 ....6.725
S. Chicago R2, U5, W14 .6.725
S. Duquesne, Pa. U5 ....6.725
Struthers, O. Y1 ....6.725
Warren, O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa, Pa. J5 ....8.30
Bessemer, Ala. T2 ....8.30
Bethlehem, Pa. B2 ....8.30
Clairton, Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse, Mich. G5 ....8.30
Fairfield, Ala. T2 ....8.30
Fontana, Calif. K1 ....9.00
Gary, Ind. U5 ....8.30
Houston S5 ....8.55
Ind. Harbor, Ind. Y1 ....8.30
Johnstown, Pa. B2 ....8.30
Kansas City, Mo. S5 ....8.55
Lackawanna, N.Y. B2 ..8.30
Los Angeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S. Chicago, Ill. R2, W14 ..8.30
S. Duquesne, Pa. U5 ....8.30
S. San Francisco B3 ....9.05
Sterling, Ill. N15 ....7.925
Struthers, O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem, Pa. (9) B2 ...5.885
Houston (9) S5 ....5.925
Kansas City, Mo. (9) S5 ..5.925
Lackawanna (9) B2 ....5.675
Sterling, Ill. N15 ....5.775
Sterling, Ill. (1) N15 ....5.675
Tonawanda, N.Y. B12 ...5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa, Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet, Ill. P22 ....5.675
Minnequa, Colo. C10 ....6.125
Niles, Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland, Oreg. O4 ....6.425
San Francisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy, Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa, Pa. J5 ....6.80
Clairton, Pa. U5 ....6.80
Gary, Ind. U5 ....6.80
Houston S5 ....7.05
Kansas City, Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Loaded (Including loaded extra) Carbon
Los Angeles P2, S30 ...11.75*

Alloy
Ambridge, Pa. W18 ...10.175
Beaver Falls, Pa. M12 ..10.175
Camden, N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria, O. W8 ....10.175
Monaca, Pa. S17 ....10.175
Newark, N.J. W18 ....10.35
Spring City, Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge, Pa. W18 ....7.65
Beaver Falls, Pa. M12, R2 .7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden, N.J. P13 ....8.10
Carnegie, Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 ....7.65
Donora, Pa. A7 ....7.65
Elyria, O. W8 ....7.65
Franklin Park, Ill. N5 ...7.65
Gary, Ind. R2 ....7.65
Green Bay, Wis. F7 ....7.65
Hammond, Ind. J5, L2 ..7.65
Hartford, Conn. R2 ....8.15
Harvey, Ill. B5 ....7.65
Los Angeles (49) S30 ....9.10
Los Angeles (49) P2, R2, .9.10
Mansfield, Mass. B5 ....8.20
Massillon, O. R2, R8 ....7.65
Midland, Pa. C18 ....7.65
Monaca, Pa. S17 ....7.65
Newark, N.J. W18 ....8.10
New Castle, Pa. (17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth, Mich. P5 ....7.90
Putnam, Conn. W18 ....8.20
Readville, Mass. C14 ....8.20
Seattle (49) S30 ....9.10
S. Chicago, Ill. W14 ....7.65
Spring City, Pa. K3 ....8.10
Struthers, O. Y1 ....7.65
Warren, O. C17 ....7.65
Waukegan, Ill. A7 ....7.65
Willimantic, Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)
Cumberland, Md. (5) C19 .6.55

BARS, Cold-Finish Alloy
Ambridge, Pa. W18 ....9.025
Beaver Falls, Pa. M12, R2 9.025
Bethlehem, Pa. B2 ....9.025
Bridgeport, Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden, N.J. P13 ....9.20
Canton, O. T7 ....9.025
Carnegie, Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.25
Detroit B5, P17 ....9.225
Detroit H5, S41 ....9.025
Donora, Pa. A7 ....9.025
Elyria, O. W8 ....9.025
Franklin Park, Ill. N5 ...9.025
Gary, Ind. R2 ....9.026
Green Bay, Wis. F7 ....9.025
Hammond, Ind. J5, L2 ..9.025
Harford, Conn. R2 ....9.326
Harvey, Ill. R5 ....9.025
Lackawanna, N.Y. B3 ..9.025
Los Angeles P2, S30 ...11.00
Mansfield, Mass. B5 ...9.325
Massillon, O. R2, R8 ...9.025
Midland, Pa. C18 ....9.025
Monaca, Pa. S17 ....9.025
Newark, N.J. W18 ....9.20
Plymouth, Mich. P5 ....9.225
S. Chicago, Ill. W14 ....9.025
Spring City, Pa. K3 ....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan, Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1.5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ...6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5, ...7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla, S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R) L5 ...19.80
McK.Rks.(Staybolt)L5 .20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4) (44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4)F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ...5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 ....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	*7.125*	7.475
Gary,Ind. U5	*7.125*	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	*7.125*	*7.475*
Kokomo,Ind. C16	7.325	....
MartinsFry, W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

Sheets, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 *7.175*

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2. .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,Wa.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calument Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2..5.10
LosAngeles(25) B3 .....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 .....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 .....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3 8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ...7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ...8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.35
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	....	....	18.85	22.95	27.80
Buffalo W12	....	....	18.85	....	....
Fostoria,O. S1	....	....	19.05	22.15	....
FranklinPark,Ill. T6	....	....	19.20	23.30	28.15
Harrison,N.J. C18	....	....	18.85	22.95	27.80
NewYork W3	....	....	18.85	22.95	27.80
Palmer,Mass. W12	....	....	18.85	....	....
Trenton,N.J. R5	....	....	18.85	22.95	27.80
Worcester,Mass. A7, T6	....	....	18.85	22.95	27.80
Youngstown S41	....	....	19.20	23.30	28.15

STRIP, C.R. Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ..7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5 .7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.10	9.35	9.75
Fairless,Pa. U5	9.10	9.35	9.75
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Hot Dipped 1.25 Common Coke	lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)	
Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. MS..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. MS 8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16...8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2...8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 .12.65
KansasCity,Mo. U3 ...12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 .....13.70
Pittsburg,Calif. C11 ....13.45
Portsmouth,O. P12 .....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ....12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. MS.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. MS ..16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 ....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 ....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	175
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	175
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIRE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	*9.20*
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb. coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	*9.50*
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb. coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	*9.55*
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage) — Stone — Stone

Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	—
Cleveland A7	17.85	—
Craw'sville M8	17.95	19.80†‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	—
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Ptts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	—

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality (6 to 8 gage) — An'ld — Galv.

Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	—
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is to great.

Structural & in., larger 12.85

7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nuts 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
*Bulk	46

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.00	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....(16)	6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1⅛		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C1S, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. I	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. K15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders (except stainless). Prices will vary with total weight of the order. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.20	9.61	10.06	....	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	....	10.41	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.74	10.58	11.77	53.50	12.16	9.77	13.35	16.69	10.16	9.62	11.08
Buffalo	8.55	9.30	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.16
Charlotte, N. C.	10.52	11.22	10.55	....	11.51	10.32	12.68	....	10.53	10.47	12.11
Chicago	9.22	10.20	10.70	52.00	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.34	10.26	10.75	65.30	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	56.18	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	10.57	10.05	11.75	....	12.13	9.98	12.98	16.95	10.21	9.81	11.18
Detroit	9.48	10.46	11.05	52.00	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	10.17	9.65	11.35	52.00	11.73	9.58	13.10	16.55	9.81	9.41	10.78
Indianapolis	9.66	10.64	11.14	....	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	61.27	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	....	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	....	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.62	10.60	11.10	....	11.79	9.62	11.05	16.40	9.97	9.46	11.75
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.00
Philadelphia	9.50	10.00	10.89	52.71	11.25	9.65	11.95	16.48	9.85	9.85	11.10
Pittsburgh	9.22	10.53	11.58	52.00	11.49	9.22	11.25	16.95	8.91	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	....	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	11.08	....	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	....	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	18.20	10.49	10.38	12.47
Seattle	11.35	12.45	13.40	54.02	12.80	10.80	10.20	17.80	11.59	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	54.02	12.65	10.65	16.20	17.85	11.35	10.80	13.01

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅝ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa. $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ¾ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Armature grade	9.50
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill Products (Per base box; 100 lb base wt)	
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating)	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60% $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe	36.75, ton del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	36.50
Bronze powder, 90/10.	54.20
Copper, all types	*15.00**
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	57.90
Solder	*7.00**
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scrafing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.80	$6.05	$5.75	$5.65	$5.95
Bar Size Angles	5.85	6.10	5.80	5.70	6.00
Structural Angles	5.75	6.00	5.70	5.60	5.90
I-Beams	5.70	5.95	5.65	5.55	5.85
Channels	5.70	5.95	5.65	5.55	5.85
Plates (basic bessemer)	5.45	5.80	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.20	24.70	24.40	24.40	25.20
Barbed Wire (†)	6.35	6.25	6.25	6.10	6.45
Merchant Bars	5.85	6.10	5.80	5.70	6.00
Hot-Rolled Bands	5.95	6.20	5.90	5.80	6.10
Wire Rods, Thomas Commercial No. 5	5.80	5.85	5.75	5.75	6.00
Wire Rods, O.H., No. 5	6.00	6.05	5.95	5.95	6.25
Bright Common Wire Nails (§)	6.80	7.05	6.75	6.65	6.95

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates .....nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$16.00-16.50*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian	
48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†
South African Transvaal	
44% no ratio	18.75
48% no ratio	24.00-26.00†
Turkish	
48% 3:1	35.00-37.00†
Domestic	
Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.70-3.20
60-65%	3.25-3.45

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c; ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max., 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max., Si 1.0% max., S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome (Simplex) Cr 63-66% or 68-71%: C 0.025% max., 31.50c; C 0.010% max., 32.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%: C 0.25% max., 33.00c. Cr 65-71%: C 0.05% max., 32.00c; C 0.10% max. 31.75c; C 0.20% max. 31.50c; C 0.50% max. 31.25c; C 1.0% max, 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%), C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max), 8M x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr, 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analysing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Sin and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained. f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $5.25 per lb (all quantities) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorous: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

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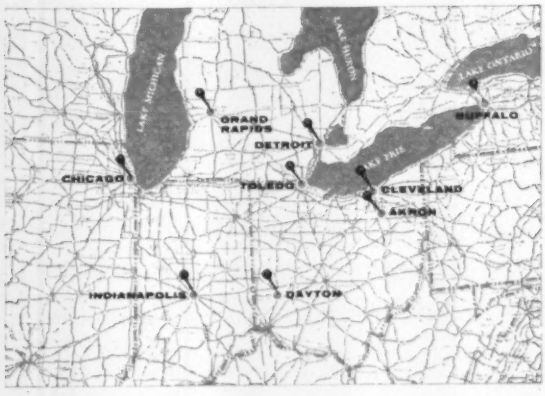

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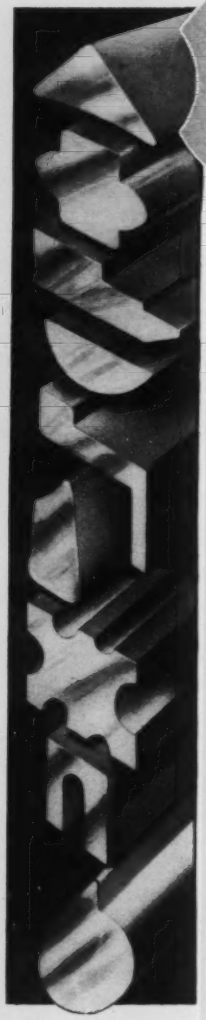

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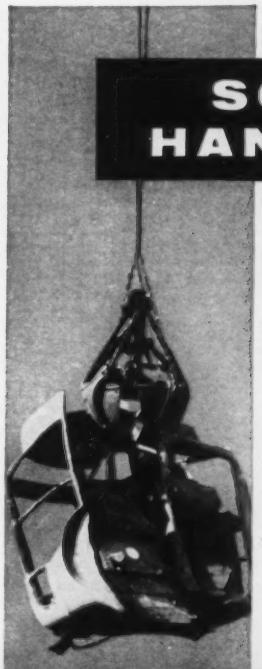

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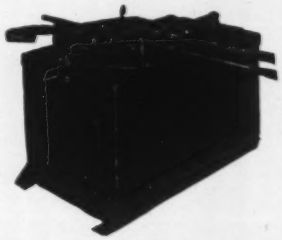

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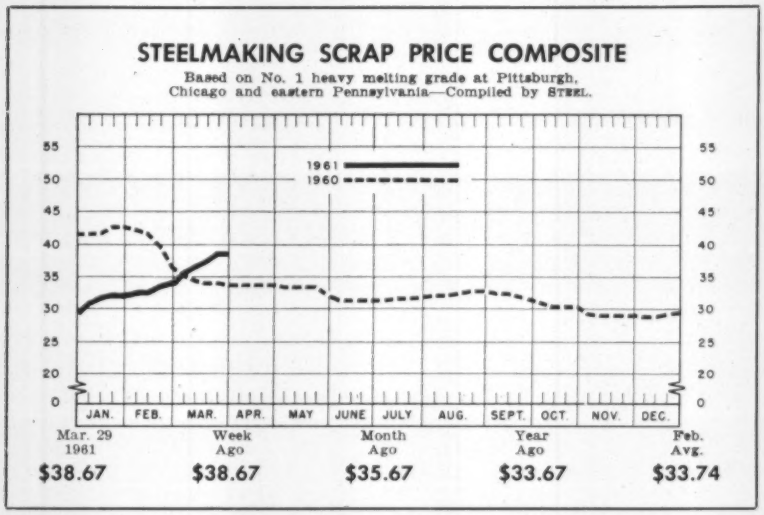


Scrap Losing Some of Its Push

STEEL's composite on No. 1 heavy melting stalls at $38.67 after rising for six straight weeks. Domestic demand is lagging but exports continue to provide support

Scrap Prices, Page 136

● **Pittsburgh**—Prices are unchanged in a firm but inactive market. Bids on industrial lists will provide the next test, and brokers are predicting they'll be higher. It's believed that a broker's request to the Pennsylvania Railroad for a rate reduction on scrap shipped to Philadelphia for export may be accepted. If the rate is cut to $8.06 a ton on 25 car trains, as proposed, dealers here may find it more advantageous to sell for export than to local mills—especially when demand is so limited.

● **New York**—Brokers' buying prices have advanced $1 to $2 a ton on the major steelmaking grades of scrap, reflecting continued strength in the export market. No. 1 heavy melting and No. 1 bundles are holding at $30-$31, and No. 2 heavy melting at $23-$24, an increase of $1 in each case. No. 2 bundles are quoted $20-$21, up $2.

The turnings grades are moving slowly, but are nominally $2 a ton higher at $5.50-$6.00 for machine shop turnings, $6.00-$6.50 for mixed borings and turnings, and $7.00-$8.00 for shoveling turnings.

● **Philadelphia**—Except for borings and turnings, scrap prices are unchanged. Machine shop turnings have advanced $2 a ton to $16, delivered, on light trading. Mixed borings and turnings are nominally $2 higher at $17, and so are heavy turnings at $27.

Domestic buying remains light, and merchant scrap is coming out more freely now that the weather encourages collections. However, strong export demand is sustaining the market in the major steelmaking grades.

● **Chicago** — Prices have held for more than a week. No. 1 heavy melting steel, both industrial and dealer, has advanced $8 a ton in the last five weeks, $13 since mid-December. No. 1 factory bundles jumped $7 and $14 in the same periods, and No. 1 railroad heavy melting has risen $8 and $12. Other leading grades show corresponding patterns.

A part of the price push comes from an indication of slowly rising demand for finished steel products during the next few weeks. However, the strongest influence is the continuing demand for scrap for export to Europe and Japan.

● **Cleveland**—With monthend bids on the auto lists holding the clue to the price trend over the immediate future, the market was nominally unchanged last week. Expectations are that list bids will be up somewhat from a month ago, largely because the April tonnage is expected to be off. In general, the market is strong despite the absence of representative sales to the mills. One Valley mill bought some No. 1 industrial heavy melting at $39, delivered.

● **Detroit**—Bids on monthend auto lists are expected to be higher than they were a month ago. The Chrysler lists show only a few more cars of scrap will be generated in April than in March. Dealers and brokers anticipate an increase of $1 to $2 a ton on the No. 1 grades. Some slackening in demand for export is noted, but brokers are still filling orders for shipment to Japan.

● **Boston**—The melt of scrap in relation to pig iron in New England is now in a ratio of nearly 3 to 1. Stocks held by scrap consumers are estimated at close to 55,000 tons. Dealers' yard stocks are kept in fair balance by continued strong exports.

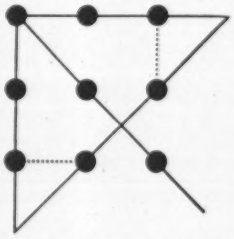
● **Buffalo** — With demand from other districts and exports putting upward pressure on the local market, prices appear poised for another rise early this month. The local mills are still holding out of the market, but there's mounting demand for Buffalo district scrap for shipment to the Ohio Valley. Unless the district mills begin to buy, substantial tonnage may soon move out of the area.

● **Cincinnati**—District mills are expected to enter the market this week

(*Please turn to Page* 141)

(Advertisement)

Solution to problem on page 16



Drawing lines beyond the dots produces a simple solution. In selection and application of steel, aluminum, plastics and metalworking machinery, don't settle for the obvious. Be "Metalogical"—call Ryerson.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Mar. 29, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 29	$38.67
Mar. 22	38.67
Feb. Avg.	33.74
Mar. 1960	34.00
Mar. 1956	50.21

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	30.00-31.00
No. 1 dealer bundles	34.00-35.00
No. 2 bundles	28.00-29.00
No. 1 busheling	34.00-35.00
No. 1 factory bundles	44.00-45.00
Machine shop turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Short turnings	20.00-21.00
Cast iron borings	19.00-20.00
Cut structurals:	
2 ft and under	40.00-41.00
3 ft and under	39.00-40.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	42.00-43.00
Electric furnace bundles	43.00-44.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
Stove plate	37.00-38.00
Unstripped motor blocks	27.00-28.00
Clean auto cast	33.00-34.00
Drop broken machinery	45.00-46.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	53.00-54.00
Random rails	46.00-47.00
Angles, splice bars	43.00-44.00
Railroad specialties	46.00-47.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	39.00-40.00
No. 1 hvy melt., dealer	37.00-38.00
No. 2 hvy melting	32.00-33.00
No. 1 factory bundles	*43.00-44.00*
No. 1 dealer bundles	*38.00-39.00*
No. 2 bundles	25.00-26.00
No. 1 busheling, indus.	39.00-40.00
No. 1 busheling, dealer	37.00-38.00
Machine shop turnings	*17.00-18.00*
Mixed borings, turnings	*19.00-20.00*
Shovel turnings	*19.00-20.00*
Cast iron borings	*19.00-20.00*
Cut structurals, 3 ft	42.00-43.00
Punchings & plate scrap	45.00-46.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	39.00-40.00
Unstripped motor blocks	36.00-37.00
Clean auto cast	49.00-50.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	*42.00-43.00*
R.R. malleable	*48.00-49.00*
Rails, 2 ft and under	53.00-54.00
Rails, 18 in. and under	54.00-55.00
Angles, splice bars	45.00-46.00
Axles	*61.00-62.00*
Rails, rerolling	*61.00-62.00*

Stainless Steel Scrap

18-8 bundles, solids	175.00-180.00
18-8 turnings	100.00-105.00
430 bundles & solids	85.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 bundles	*33.00-34.00*
No. 2 bundles	*21.00-22.00*
No. 1 busheling	*30.00-31.00*
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Stove plate	26.00-27.00
Heavy breakable	25.00-26.00
Unstripped motor blocks	22.00-23.00
Charging box cast	27.00-28.00
Clean auto cast	38.00-39.00

CLEVELAND

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 factory bundles	40.00-41.00
No. 1 bundles	*36.00-37.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling	*35.00-36.00*
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	33.00-34.00
Cut structurals, plate, 2 ft and under	40.00-41.00
Low phos. punchings & plate	35.00-36.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	36.00-37.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	45.00-46.00
Burnt cast	32.00-33.00
Drop broken machinery	46.00-47.00

Railroad Scrap

R.R. malleable	45.00-46.00
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	52.00-53.00
Rails, random lengths	44.00-45.00
Cast steel	42.00-43.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	47.50-48.50
Angles, splice bars	43.50-44.50
Rails, rerolling	56.00-57.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	70.00-75.00
430 clips, bundles, solids	70.00-75.00
430 turnings	15.00-25.00

YOUNGSTOWN

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	*25.00-26.00*
No. 1 busheling	*39.00-40.00*
No. 1 bundles	*39.00-40.00*
No. 2 bundles	*25.00-26.00*
Machine shop turnings	14.00-15.00
Shovel turnings	19.00-20.00
Cast iron borings	19.00-20.00
Low phos.	39.00-40.00
Electric furnace bundles	*40.00-41.00*

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00

BUFFALO

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	29.00-30.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Shovel turnings	16.00-17.00
Machine shop turnings	12.00-13.00
Cast iron borings	14.00-15.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-46.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Rails, rerolling	58.50-59.50
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*31.00-32.00*
No. 2 heavy melting	*28.50-29.50*
No. 1 bundles	*32.00-33.00*
No. 2 bundles	21.00-22.00
No. 1 busheling	*31.00-32.00*
Machine shop turnings	11.00-12.00
Mixed borings, turnings	12.00-13.00
Shovel turnings	13.00-14.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	*39.00-40.00*

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable cast	28.00-29.00
Charging box cast	35.00-36.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	46.00-47.00
Rails, random lengths	40.00-41.00

PHILADELPHIA

No. 1 heavy melting	43.00
No. 2 heavy melting	38.00
No. 1 bundles	44.00
No. 2 bundles	28.00
No. 1 busheling	44.00
Electric furnace bundles	45.00
Mixed borings, turnings	*17.00*
Shovel turnings	21.00
Machine shop turnings	14.00
Heavy turnings	*27.00*
Structurals & plates	44.00-46.00
Couplers, springs, wheels	46.00
Rail crops, 2 ft & under	52.00-54.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	41.00
Drop broken machinery	50.00-51.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 bundles	*30.00-31.00*
No. 2 bundles	*20.00-21.00*
Machine shop turnings	*5.50-6.00*
Mixed borings, turnings	*6.00-6.50*
Shovel turnings	*7.00-8.00*
Low phos. structurals & plates	32.00-33.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	29.00-30.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*28.50-29.00*
No. 2 heavy melting	*25.00-26.00*
No. 1 bundles	*28.00-29.00*
No. 1 busheling	*28.50-29.00*
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	*32.00-33.00*
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	*29.00-30.00*
No. 1 bundles	32.00-33.00
No. 2 bundles	*23.00-24.00*
No. 1 busheling	32.00-33.00
Cast iron borings	10.00-11.00
Machine shop turnings	*19.00-20.00*
Shovel turnings	*21.00-22.00*
Bar crops and plates	*43.00-44.00*
Structurals & plate	*42.00-43.00*
Electric furnace bundles	34.00-35.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	*44.00-45.00*
Stove plate	*44.00-45.00*
Unstripped motor blocks	32.00-33.00
No. 1 wheels	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	*47.00-48.00*
Rails, random lengths	38.00-39.00
Angles, splice bars	*43.00-44.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	35.00
No. 2 heavy melting	29.00
No. 1 bundles	35.00
No. 2 bundles	26.00
No. 1 busheling	35.00
Machine shop turnings	14.00
Shovel turnings	16.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	35.00
Heavy breakable cast	33.00
Unstripped motor blocks	35.00
Clean auto cast	41.00
Stove plate	35.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00
Rails, random lengths	39.00†
Rails, rerolling	*52.00-53.00*
Rails, 18 in. and under	*41.00-42.00*
Angles, splice bars	40.00†

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	36.00
No. 1 bundles	37.00-38.00
No. 2 bundles	*26.00-27.00*
Machine shop turnings	*11.00-12.00*
Low phos. plate & structurals:	
3 ft	43.00
2 ft and under	*43.00-44.00*

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable	*26.00-27.00*
Foundry malleable	*30.00-31.00*
Unstripped motor blocks	*31.00-32.00*

Railroad Scrap

R.R. heavy melt. (3 ft)	43.00

LOS ANGELES

No. 1 heavy melting	40.00
No. 1 hvy melt (export)	40.00-43.00
No. 2 heavy melting	38.00
No. 2 hvy melt (export)	40.00
No. 1 bundles	34.00
No. 2 bundles	24.00-27.00
No. 2 bundles (export)	29.00
Machine shop turnings	12.00
Shovel turnings	13.00
Cast iron borings	13.00
Cut structurals and plate 1 ft and under	43.00

Cast Iron Grades

No. 1 cupola	46.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-36.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	41.00
No. 2 heavy melting	38.00
No. 2 bundles	23.00-24.00
Shovel turnings	13.00
Electric furnace bundles	45.00-47.00

Cast Iron Grades

No. 1 cupola	44.00
Heavy breakable	39.00
Unstripped motor blocks	36.00
Stove plate (f.o.b. plant)	39.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	41.00
No. 1 hvy (unprepared)	38.00
No. 2 heavy melting	38.00
No. 2 hvy (unprepared	35.00
No. 2 bundles	23.00-24.00
Shovel turnings	15.00
Electric furnace bunldes	47.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Unstripped motor blocks	36.00
Stove plate (f.o.b. plant)	39.00

SAN FRANCISCO

No. 1 heavy melting	40.00**
No. 2 heavy melting	37.00**
No. 1 bundles	34.00**
No. 2 bundles	25.00**
Machine shop turnings	20.00**
Mixed borings, turnings	20.00**
Cast iron borings	20.00**
Heavy turnings	20.00**
Shovel turnings	20.00**
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

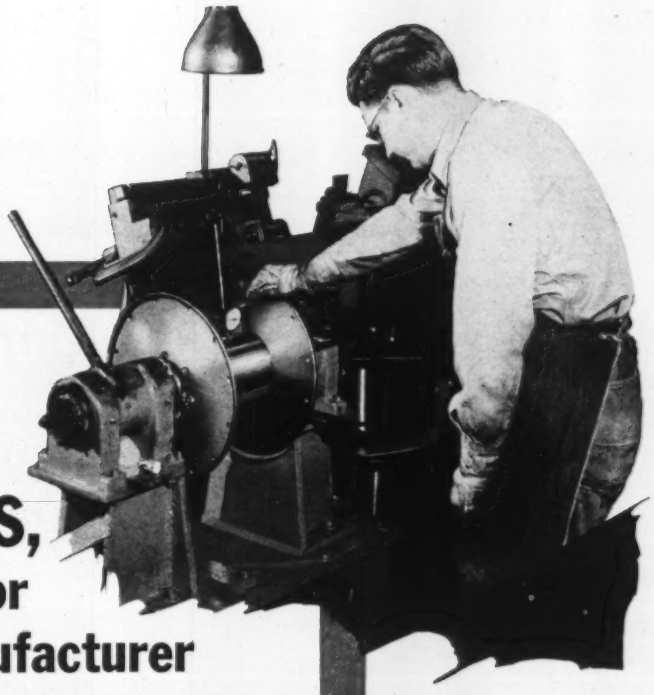
(Brokers' buying prices; net tons)

No. 1 heavy melting	28.00
No. 2 hvy melt, 2 ft & under	27.00
No. 1 bundles	28.00
No. 2 bundles	17.50
Mixed steel scrap	20.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	28.00
Unprepared	22.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

*For export add $4 dock charge.
**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
‖Delivered.



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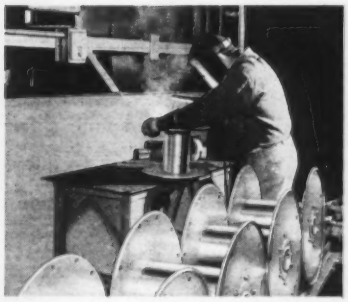

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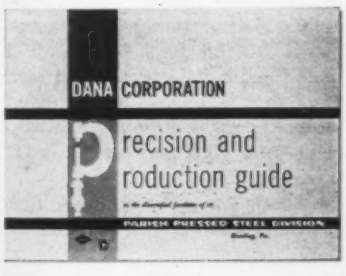

PARISH
PRESSED STEEL

DIVISION OF DANA CORPORATION • READING, PENNSYLVANIA

Says researcher Schrade F. Radtke:

More R&D, Marketing Needed For Lead-Zinc to Compete

WORLD LEAD and zinc producers have set their latest strategy to increase markets, control production, and to halt mounting stocks. The third meeting of the United Nations sponsored International Lead-Zinc Study Group—this one in Mexico City—drew representatives from 25 producing and consuming countries, including Soviet Bloc nations.

• **One Road** — Dr. Schrade F. Radtke, director of the American Zinc Institute-Lead Industries Association expanded research program, suggested the best way to create new uses and expand old ones for the two metals is through co-operative international research. "Only with such a program, supplemented by vigorous sales and marketing efforts, can the zinc and lead industries survive in our highly competitive world market."

The AZI-LIA's world-wide co-operative research program has already achieved important results in many important consuming areas, Dr. Radtke says. But he bluntly told delegates much more research must still be done to prevent serious inroads by competing materials and that to remain competitive the industry must initiate more aggressive sales and marketing efforts.

• **Short Term Program** — There's virtual unanimity that research is the best answer to long range problems, but delegates at Mexico City were more concerned with what to do about the short term troubles—specifically, rapidly mounting stocks. No action was taken on zinc because producer stocks are considered excessive only in the U. S. Further, a 4 per cent rise in world zinc consumption was forecast for the year (although little change was foreseen in the level of U. S. sales).

Lead is another story. An agreement was reached to curtail output: About 2 per cent under projected world consumption. That would mean a reduction of 80,000 to 90,000 tons, mainly in Australia, Mexico, Peru, Sweden, the U. S., and nations of the European Economic Community. Yugoslavia indicated it would reduce its production or exports this year. The Soviet Bloc was put on the spot with passage of a resolution calling for no increase in its exports from the 1960 level.

• **Another Barter Program** — Biggest surprise of the conference was the announcement that the U. S. will reinstitute the barter program to help keep surplus lead off the world market. Under barter, surplus U. S. farm products are traded for the metal. It works like this: A U. S. trader makes a straight swap deal with someone overseas—so much wheat, corn, or soy beans—for a like value in lead. The lead is then sold to Uncle Sam and goes into the supplemental stockpile.

Details of the program have not been announced. The U. S. did say that only lead accumulated prior to last Dec. 31 will be bartered and that all trade deals must be made before May 15.

• **Evaluation**—Opinions vary as to whether this newest approach to controlling lead surpluses will work. One source close to the conference believes the meeting marks the best approach yet to dealing with the problem on an international basis. Metalmen, in general, see some good coming out of the conference but warn the steps taken still leave many unanswered questions. For example, even with the controls, will surplus bullion keep piling up at many refineries? How good are the production-consumption figures presented at the conference? Finally, how much metal will the U. S. take under barter?

Aluminum Output Down

The U. S. primary aluminum industry operated at a little over 73 per cent of capacity in February, a drop from the January rate. Output was 138,560 tons, reports the Aluminum Association. Producers have been trimming output over the last few months to work off stocks built up last year—a record 2 million tons was turned out.

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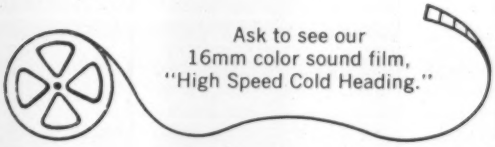

*1/8-inch High Speed Cold Header
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HARTFORD DETROIT CHICAGO

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.
Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 28.50-29.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 29.00 deld.; custom smelters, 29.00; lake, 29.00 deld.; fire refined, 28.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $206-208 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb. f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz. nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.
Rhodium: $137-140 per troy oz.
Ruthenium: $55-60 per troy oz.
Selenium: $6.50-7 per lb, commercial grade.
Silver: Open market, 91.375 per troy oz.
Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $3.50-5 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot and prompt, 104.25.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.
Zinc: Prime western, 11.50; brass special, 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 24.25; manganese bronze, No. 421, 28.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.935, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.935, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 34.355; l.c.l., 34.98. Weatherproof, 20,000-lb lots, 35.55; l.c.l., 36.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.60
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 22.00-22.50; No. 2 heavy copper and wire, 20.50-21.00; light copper, 18.00-18.50; No. 1 composition red brass, 19.00-19.50; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 29.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	54.13b	51.36c	....	55.32	25.000	25.000	24.250
Yellow Brass	48.10	33.71d	48.39	52.26	19.250	18.375	17.375
Low Brass, 80%	50.65	50.39	50.94	54.71	21.375	21.125	20.625
Red Brass, 85%	51.54	51.48	51.83	55.60	22.250	22.000	21.500
Com. Bronze, 90%	52.98	52.92	53.27	56.79	23.000	22.750	22.250
Manganese Bronze	56.56-56.59	50.22-50.24	60.47	....	18.000	17.750	17.250
Muntz Metal	50.94	46.25	....	....	18.125	17.875	17.375
Naval Brass	52.86	46.67	59.17	57.02	18.000	17.750	17.250
Silicon Bronze	59.49	58.68	58.78	77.90	24.500	24.250	23.500
Nickel Silver, 10%	63.66	65.99	65.74	....	24.125	23.875	12.062
Phos. Bronze, A-5%	74.59	75.09	74.34	76.52	26.125	25.875	24.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 18.00-18.50; new brass clippings, 16.00-16.50; light brass, 13.00-13.50; heavy yellow brass, 14.00-14.50; new brass rod ends, 15.00-15.50; auto radiators, unsweated, 14.25-14.75; cocks and faucets, 15.50-16.00; brass pipe, 16.00-16.50.

Lead: Soft scrap lead, 7.00-7.50; battery plates, 2.75; linotype and stereotype, 8.00-8.25; electrotype, 7.50-7.75; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-23.50; old sheets, 22.00-23.00; turnings, 16.50-17.00; rods, 22.00-23.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 2.75-3.00; new diecast scrap, 2.75-3.00; old diecast scrap, 1.00-1.25.

Aluminum: Old castings and sheets, 9.00-9.50; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.00-11.50; segregated high copper clips, 10.00-10.50; mixed low copper clips, 10.50-11.00; mixed high copper clips, 10.00-10.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.50-8.00; segregated low copper clips, 15.50-16.00; segregated high copper clips, 13.50-14.00; mixed low copper clips, 13.00-13.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 8.50-9.00; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 55.00; light scrap, 50.00; turnings and borings, 35.00.

Copper and Brass: No. 1 heavy copper and wire, 25.50; No. 2 heavy copper and wire, 24.00; light copper, 21.75; refinery brass (60% copper) dry copper content, 22.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 25.50; No. 2 heavy copper and wire, 23.75; light copper, 21.50; No. 1 composition borings, 21.50; No. 1 composition solids, 22.00; heavy yellow brass solids, 16.50-17.50; yellow brass turnings, 14.50-16.50; radiators, 17.50.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.
Copper: Flat-rolled, 46.04; oval, 42.50; electrodeposited, 38.00; cast, 40.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 122.50; 200-499 lb, 121.00; 500-999 lb, 120.50; 1000 lb or more, 120.00.

Zinc: Balls, 18.75; flat tops, 18.75; flats 21.50; ovals, 20.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.00; 2000-5900 lb, 13.00; 6000-11,900 lb, 12.75; 12,000-22,900 lb, 12.50; 23,000 lb or more, 12.00.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 80.60; 100-600 lb, 71.20; 700-1900 lb, 68.40; 2000-9900 lb, 66.60; 10,000 lb or more, 65.20.

Stannous Chloride (Anhydrous): 25 lb, 156.20; 100 lb, 151.40; 400 lb, 148.90; 800-19,900 lb, 108.00; 20,000 lb or more, 102.00.

Stannous Sulphate: Less than 50 lb, 141.30; 50 lb, 111.30; 100-1900 lb, 109.30; 2000 lb or more, 107.30.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 135*)

with orders for April delivery. Brokers have increased their buying prices $1 a ton on the chief steelmaking grades in anticipation of new mill orders. No. 1 heavy melting is quoted $31-$32.

• **St. Louis**—The market is strong. Local demand and pressure for export tonnage are the chief factors for strength. A substantial amount of material is moving from winter accumulations, but activity is not sufficient to boost dealers' buying prices much. The two big mills in this area are taking about twice as much scrap now as they were a month or two ago.

• **Birmingham** — Strong export demand has sent prices soaring here. Brokers are quoting the following nominal prices, based on export quotations: No. 1 heavy melting $34-$35, No. 2 heavy melting $29-$30, No. 2 bundles $23-$24, bar crops and plates $43-$44, angles and splice bars $43-$44, structurals and plates $42-$43. Machine shop turnings are up $3 to $21-$22, shovel turnings $3 to $21-$22. In the cast iron grades, No. 1 cupola and stove plate are off $1 a ton.

• **Houston**—One Texas steel mill has placed new orders for scrap and recalled about 400 furloughed workmen. Another area mill is expected to re-enter the market shortly. The higher prices established last month are being paid. Exports continue strong and further price advances are anticipated. Better weather is stimulating collections. No. 1 heavy melting is quoted $38-$39.

Scrap Exports Help Hold Down the Outflow of Gold

Exports of ferrous scrap under government license in 1960 brought a 44 per cent increase in the amount of U. S. income earned by scrap from 1959 to 1960, reports William S. Story, assistant executive vice president, Institute of Scrap Iron & Steel Inc.

"In keeping with increased ex-

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For Leading Eastern Steel Service Center

REQUIREMENTS:

(1) At least 3 years operating as sales manager, industrial metal products sales. Experience in alloy & stainless tubing preferable but not essential.

(2) Proven leadership in training & directing salesmen and representatives.

(3) Ability to plan, organize & obtain sales objectives.

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- Share company profits
- Car & expenses
- Complete company benefits

Reply giving full history to
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wanted for Indiana, Missouri, Wisconsin, Maryland, Virginia and New England States to sell electro-zinc coated steel in coils up to 36 in. wide and enamel coated steel in coils up to 60 in. wide. Triple A-1 Company.

Reply Box 918, STEEL
Penton Bldg. Cleveland 13, Ohio

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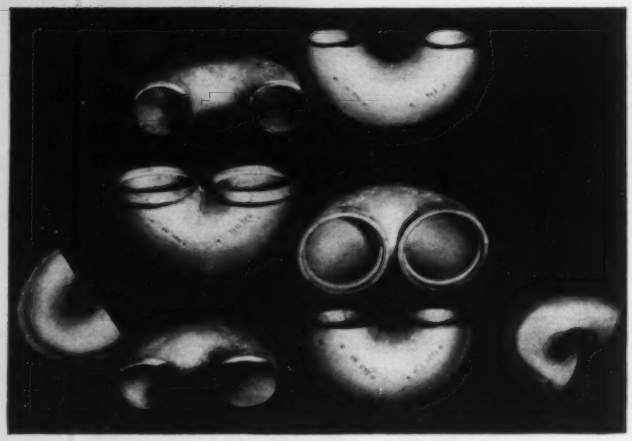

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- ***much more intricate design.***
- ***thinner wall sections.***

Coupled with these are the close adherence to design dimensions, superior finish and faster production.

If you are looking for quantity deliveries on castings ranging in weight from an ounce or two to several pounds, our shell molding department is at your service. It is backed by nearly forty years broad experience in the high alloy casting field, which covers static and centrifugal castings as well as shell molded.

Send for Bulletin G-159.

ALLOY CASTING INSTITUTE ACI MEMBER

THE DURALOY Company
OFFICE AND PLANT: Scottdale, Pa.
EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
CHICAGO OFFICE: 332 South Michigan Avenue
DETROIT OFFICE: 23908 Woodward Avenue, Pleasant Ridge, Mich.

ports of many other products in 1960, scrap helped play an important role in the balance of payments equation during the year, and helped reduce the outflow of gold," he says.

He points out that figures recently released by the Commerce Department showed scrap exports in 1959 were valued at $168 million, and 1960 exports were valued at $242 million. In 1959, exports of scrap amounted to 4,346,000 gross tons, and in 1960, they were 6,412,000 tons.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

6000 tons, detention center and prison equipment, Los Angeles, to Decatur Iron & Steel Co., Decatur, Ala.

4200 tons, passenger terminal, Berths 93A and 94-4, San Pedro, Calif., to American Bridge Div., U. S. Steel Corp., Pittsburgh.

1224 tons, footings, etc., for 69 transmission towers (government furnished), 14.1 mile line, Pierce and King Counties, Washington; general erection contract to Tyee Construction Co., Mercer Island, Wash., low at $331,168 to Bonneville Power Administration, Portland, Oreg.

900 tons, addition, Chevrolet assembly plant, Baltimore, through Robert E. Lamb, to Taylor & Gaskin, Detroit.

675 tons, Riddle Memorial Hospital, Media, Pa., to Keystone Structural Steel Co., Trenton, N. J.

425 tons, grade separation, Cermak Road and 25 Avenue, Chicago, to Chicago Heights Steel Co., Chicago Heights, Ill.

416 tons, including 116 tons of reinforcing bars, high school building, New Milford, Conn., to Topper & Griggs (Bethlehem Fabricators Inc.), West Hartford, Conn.; Bonvicini Building Co. Inc., Torrington, Conn., general contractor.

370 tons, Washington State, Tilton River bridge, to Poole, McGonigle & Dick, Portland, Oreg.; Troy T. Burnham, Seattle, general contractor.

STRUCTURAL STEEL PENDING

10,000 tons, transmission towers, Arizona Public Services, Phoenix, Ariz., bids Apr. 15.

6500 tons, piling, right bank cofferdam, Barkley Dam project, Lyon County, Kentucky; bids Apr. 12 to the U. S. Engineer, Nashville, Tenn.

3000 tons, 17 story Standard Insurance Co. office building, Portland, Oreg.; Anderson-Westfall Co. Inc., Portland, low at $6,388,054.

2500 tons, Oregon state, seven welded steel highway ramps, Multnomah County; bids to Salem, Oreg., Apr. 14.

1400 tons, two three span plate girder bridges, also two, three span composite wide flange bridges, Contract 1, Richmond-Williston, Vt., Lane Construction Co., Meriden, Conn., low on the general contract; also required, 605 tons of reinforcing bars and 10,272 linear feet of steel piles.

1200 tons, also reinforcing, Oregon state highway overcrossing, at Medford; bids to Salem, Oreg., Apr. 14.

1060 tons, plant addition, Allentown, Pa., for Western Electric Co.

690 tons (government furnished), footings and tower steel, transmission line in Franklin and Walla Walla Counties, Washington; bids to Bonneville Power Administration, Portland, Oreg., Apr. 7.

595 tons, state highway bridge, Hartford, Conn.; bids Apr. 10, Hartford, Conn.; also, 517 tons of concrete reinforcing bars, and 2530 tons of steel piles.

420 tons, also 70 tons of reinforcing, Washington State, girder span and underpass, Snohomish County; general contract to Floroto Bros., Seattle, low at $742,977.

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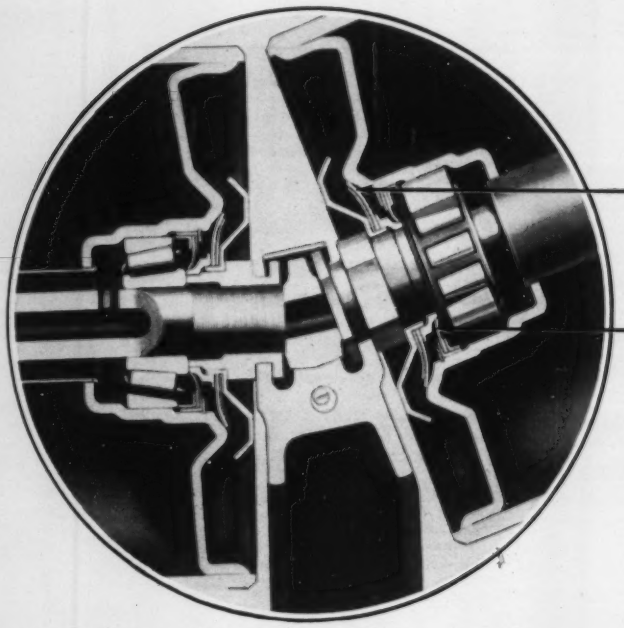


Insist on this seal...

you'll get longer idler service

HERE'S WHY. Jeffrey designed Permaseal belt idlers for extra-long service in severe applications with an absolute minimum of maintenance. They stay lubricated. Diaphragm *double* seals protect both ends of every roller. Inner seal keeps the grease in; outer seal keeps dirt out.

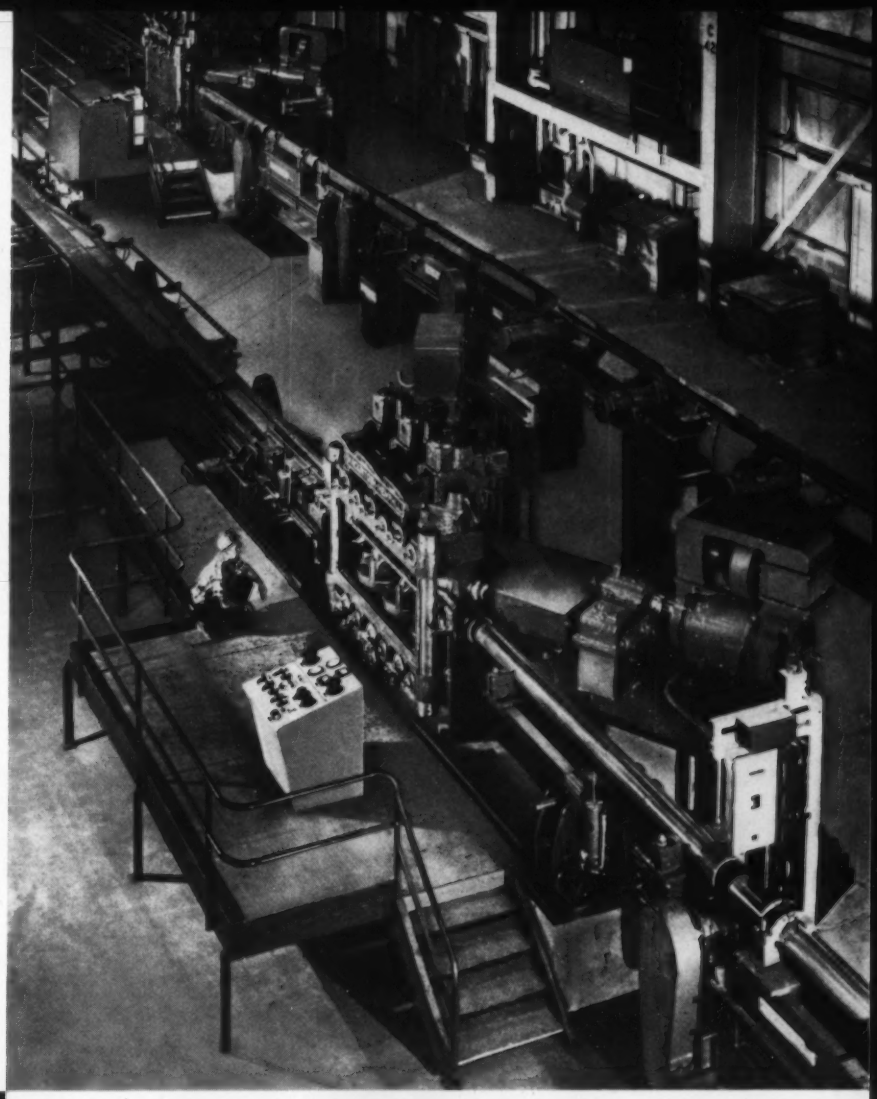
In addition to providing longer, more satisfying service, this positive sealing makes greasing easier when it is needed. You can add grease to either side of a Jeffrey Permaseal® Idler without danger that grease might escape through the other side onto conveyor belts. No grease pipes needed, either.

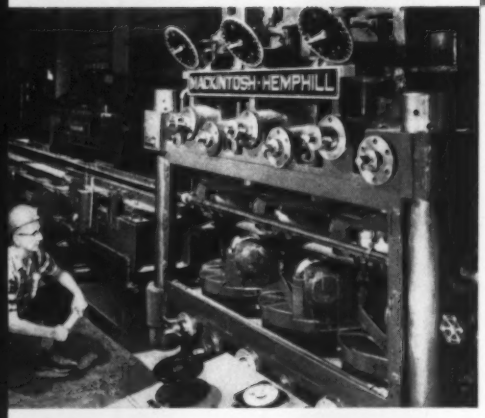
This extra assurance of satisfying performance through proper seal design is only one of the many reasons you get more dependability over a longer life from Jeffrey Permaseal Idlers. More extras are described in Bulletin 925A. Write for it today, or contact your nearest Jeffrey authorized distributor. The Jeffrey Manufacturing Company, 889 North Fourth Street, Columbus 16, Ohio.

If it's conveyed, processed, or mined, it's a job for Jeffrey.

JEFFREY

Why Mack-Hemp straighteners were selected for the world's most modern continuous weld pipe mill





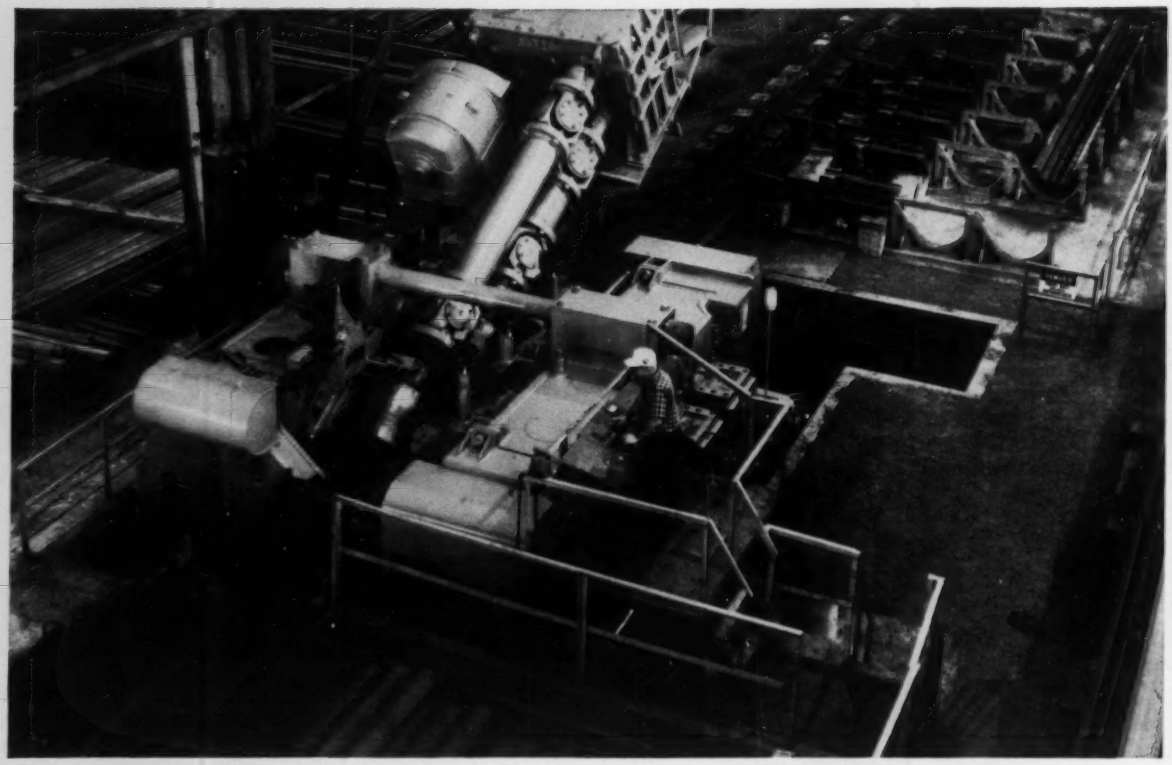
The new continuous pipe mill at Lorain Works of U.S. Steel's National Tube Division is probably the most productive facility of its kind in the world, exceeding the record-breaking pipe mill at Fairless Works.

With straightness and roundness of delivered pipe more critical than ever, the Lorain Works assigns this important finishing task to two Mackintosh-Hemphill 6-roll guideless rotary straighteners. The two can process 1800 feet of pipe per minute. Finished pipe is perfectly straight and round, without spiral markings. "End hooks" at back and front are completely removed. Moreover, the straighteners' open three-post construction makes the rolls readily accessible, so that set-up time is cut to a minimum.

If you're concerned with straightening pipe or tube—no matter what the diameter or wall thickness—it will pay you to talk to Mack-Hemp. We have helpful information for you.

BLISS

MACKINTOSH-HEMPHILL
Division of E. W. BLISS Company
Pittsburgh and Midland, Pa.

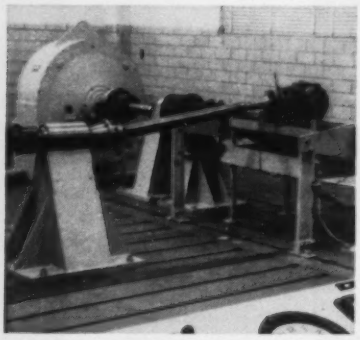


Timken® bearings withstand extreme shock loads on Sutton's largest bar straightener

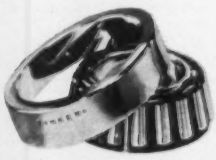
When the Sutton Engineering Company designed this "5BC" straightener for Sheffield Div. of Armco Steel Corp., they wanted to be sure it would withstand the shocks of straightening large diameter heat treated alloy steel bars at speeds of 30 to 90 f.p.m. and with high precision. Their solution for trouble-free performance—Timken® tapered roller bearings for the drive and idler rolls, speed reducer drive and universal joints.

Because of their tapered design, Timken bearings take any combination of radial and thrust loads. Timken bearings roll true, practically eliminate friction, save input power. And because of Timken bearings' higher capacity, Sutton engineers could save space by keeping bearing sizes to a minimum. What's more they had the advantage of using the new Timken pin-cup bearings in the drives to prevent creeping, assure positive lubrication and longer bearing life. Dependable performance is one of the reasons why Sutton uses Timken bearings for all its tapered roller bearing needs.

ON-THE-SPOT engineering service from our graduate-engineer salesmen solves bearing problems. They can help you select the one bearing from thousands that is exactly right for each position.



RESEARCH AND DEVELOPMENT, typified by the dynamometer above help keep Timken bearings your No. 1 bearing value. The data it provides helps increase performance of Timken bearings.



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